



Noise and Vibration Management Sub-plan

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Parklife Metro D&C

Document Approval

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Glossary/Abbreviations

Abbreviation	Expanded Text
AS	Australian Standard
AMM	Additional Mitigation Measures
AVTG	NSW EPA guideline Assessing Vibration: A Technical Guideline
CEMF	Construction Environmental Management Framework
CNVIS	Sydney Metro Construction Noise and Vibration Standard
Condition	Planning Minister's Condition of Approval
Construction	Includes all work required to construct the CSSI as described in the documents listed in Conditions A1, including commissioning trials of equipment and temporary use of any part of the CSSI, but excluding Low Impact Work.
dB(A)	A-weighted decibels is an expression of the relative loudness of sounds in the air as perceived by the human ear.
DECC	NSW Department of Environment and Climate Change
DNVIS	Detailed Noise and Vibration Impact Statement
DPE	NSW Department of Planning and Environment, who are the Appropriate Regulatory Authority for matters under the EP&A Act
EIS	Environmental Impact Statement
EM	Environment Manager
EMS	Environmental Management System
EPA	NSW Environmental Protection Authority – The Appropriate Regulatory Authority for project activities on NSW land (off-airport land), as defined in Section 6(2)(c) of the POEO Act 1997
EPL	Environmental Protection License
ER	Environmental Representative nominated by the Proponent and approved by the Planning Secretary in accordance with Condition A27
ICNG	NSW Department of Environment and Climate Change – NSW Interim Construction Noise Guideline, July 2009.
IS	Infrastructure Sustainability (IS) Council
LA₉₀	Background Noise Level. 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).
LA_{eq}	Equivalent Continuous Sound Level
LGA	Local Government Area
LP or SPL	Sound Pressure Level
LW or SWL	Sound Power Level
Minister, the	NSW Minister for Planning and Public Spaces (or delegate)
NCA	Noise Catchment Area
NML	Noise Management Level
NPI	NSW Environment Protection Authority, <i>Noise Policy for Industry, 2017</i>
Non-compliance	An occurrence, set of circumstances, or development that results in a non-compliance or is non-compliant with Infrastructure Approval or other licence, permit, legal requirements, or CEMP or Sub-plan, but is not an incident
NVMP	Noise and Vibration Management Sub-plan (this Plan)
OOHW	Out of Hours Works
Parklife Metro	Consortium comprising entities of Plenary, Siemens, RATP Dev and Webuild as the Applicant for the Sydney Metro Western Sydney Airport SSTOM Package.

Abbreviation	Expanded Text
Parklife Metro D&C	Parklife Metro Design and Construct. Consists of Webuild S.P.A, Siemens Mobility Pty Ltd and Richard Crookes Constructions Pty Ltd. Responsible for the construction of SSTOM Works
POEO Act	Protection of the Environment Operations Act 1997.
PPV	Peak Particle Velocity (in mm/s)
RBL	Rating Background Noise Level
REMM	SSD 7308 Revised Environmental Management Measures
RNP	NSW Department of Environment, Climate Change and Water – NSW Road Noise Policy, March 2011.
ROL	Road Occupancy Licence
SMWSA	Sydney Metro Western Sydney Airport
SSTOM	Stations, Systems, Trains, Operations and Maintenance
TfNSW CNVS	Transport for NSW Construction Noise and Vibration Strategy
the Principal	Sydney Metro
the Project	Sydney Metro Western Sydney Airport
VDV	Vibration Dose Value (in m/s ^{1.75})

1 Introduction

This NSW (off-airport) Noise and Vibration Management Sub-plan (NVMP, this Sub-plan) is applicable to the SSTOM Works of the Sydney Metro Western Sydney Airport Project (the Project). This Sub-plan describes how Parklife Metro D&C will minimise and manage noise and vibration impacts during construction of the SSTOM Works on NSW land (State controlled land).

This Sub-plan has been prepared to address the requirements of the:

- State Significant Infrastructure (SSI) 10051 Planning Approval (dated 23 July 2021)
- SSI 10051 Mod 1 (determined 14 April 2022), which includes a modification to Condition E4 to reduce the biodiversity offsets credit requirements
- Sydney Metro Western Sydney Airport – CSSI Staging Report (Staging Report)
- AS/NZS ISO 14001:2015 Environmental Management Systems – Requirements with guidance for use
- Sydney Metro Construction Environmental Management Framework (CEMF)
- Environmental Impact Statement (EIS) and the Submissions Report, including the Revised Environmental Mitigation Measures (REMMs)
- Contractual requirements
- Applicable legislation (NSW and Commonwealth).

1.1 Background

Sydney Metro is Australia's biggest public transport program comprising four main packages of work including Metro North West Line, Sydney Metro City and Southwest, Sydney Metro West and Sydney Metro Western Sydney Airport. The Sydney Metro Western Sydney Airport Project (the Project) will become the transport spine for Greater Western Sydney, connecting communities and travellers with the new Western Sydney International (Nancy-Bird Walton) Airport (referred to as Western Sydney International) and the growing region.

The Sydney Metro Western Sydney Airport Environmental Impact Statement (EIS) was prepared in October 2020, which assessed the impacts of the construction and operation of the Project. The Project EIS was placed on public exhibition for a period of six weeks from 21 October to 2 December 2020. The Project was declared a Critical State Significant Infrastructure (CSSI) Project and is listed in Schedule 5 of *State Environmental Planning Policy (State and Regional Development)*.

The Sydney Metro Western Sydney Airport Project was approved by the Minister for Planning and Public Spaces on 23 July 2021 (SSI 10051) under section 5.19 of the *Environmental Planning and Assessment Act 1997* (EP&A Act).

The Project involves the construction and operation of a new metro railway line around 23km in length that extends from the existing Sydney Trains suburban T1 Western Line at St Marys in the north and the Aerotropolis in the south at Bringelly. The alignment includes a combination of tunnel, surface, bridges and viaduct sections and comprises of six new metro stations between St Marys and the Aerotropolis Core precinct, as well as a stabling and maintenance facility and operational control centre to support the operation of the new metro railway line (see Figure 1).

1.2 Scope

The scope of this NVMP is to describe how Parklife Metro D&C will minimise and manage potential noise and vibration impacts of the SSTOM Works and discuss how compliance and implementation of the applicable sections from the following documents, collectively referred to herein as the 'Project requirements':

- NSW Minister for Planning and Public Spaces Conditions of Approval (Conditions)
- Revised Environmental Mitigation Measures (REMMs)
- Sydney Metro Construction Environmental Management Framework (CEMF)
- Sydney Metro Construction Noise and Vibration Standard (CNVS).

The SSTOM Works scope as part of the Sydney Metro Western Sydney Airport Project includes:

- Installation of tracks, signalling, mechanical and electrical systems
- Construction of a stabling and maintenance facility at Orchard Hills

- Construction of the lower chamber of Bringelly shaft, along with capping and backfill
- Construction of the lower chamber of Claremont Meadows shaft, along with capping and backfill
- Construction of six stations, including:
 - A new metro station connecting to, and providing an interchange with, the T1 Western Line (part of the existing Sydney Trains suburban rail network) at St Marys
 - Two new metro stations between the T1 Western Line and Western Sydney International; one at Orchard Hills and one at Luddenham within the Northern Gateway Precinct
 - Two new metro stations within the Western Sydney International site; one at the Airport Terminal and one at the Airport Business Park, both of which are located on Airport land and are managed under a separate CEMP
 - A new metro station within the Aerotropolis Core precinct, south of Western Sydney International.

The SSTOM Package also includes the supplying new driverless trains, and the operation and maintenance of the new metro railway line and its assets, which will be managed separately to this NVMP.

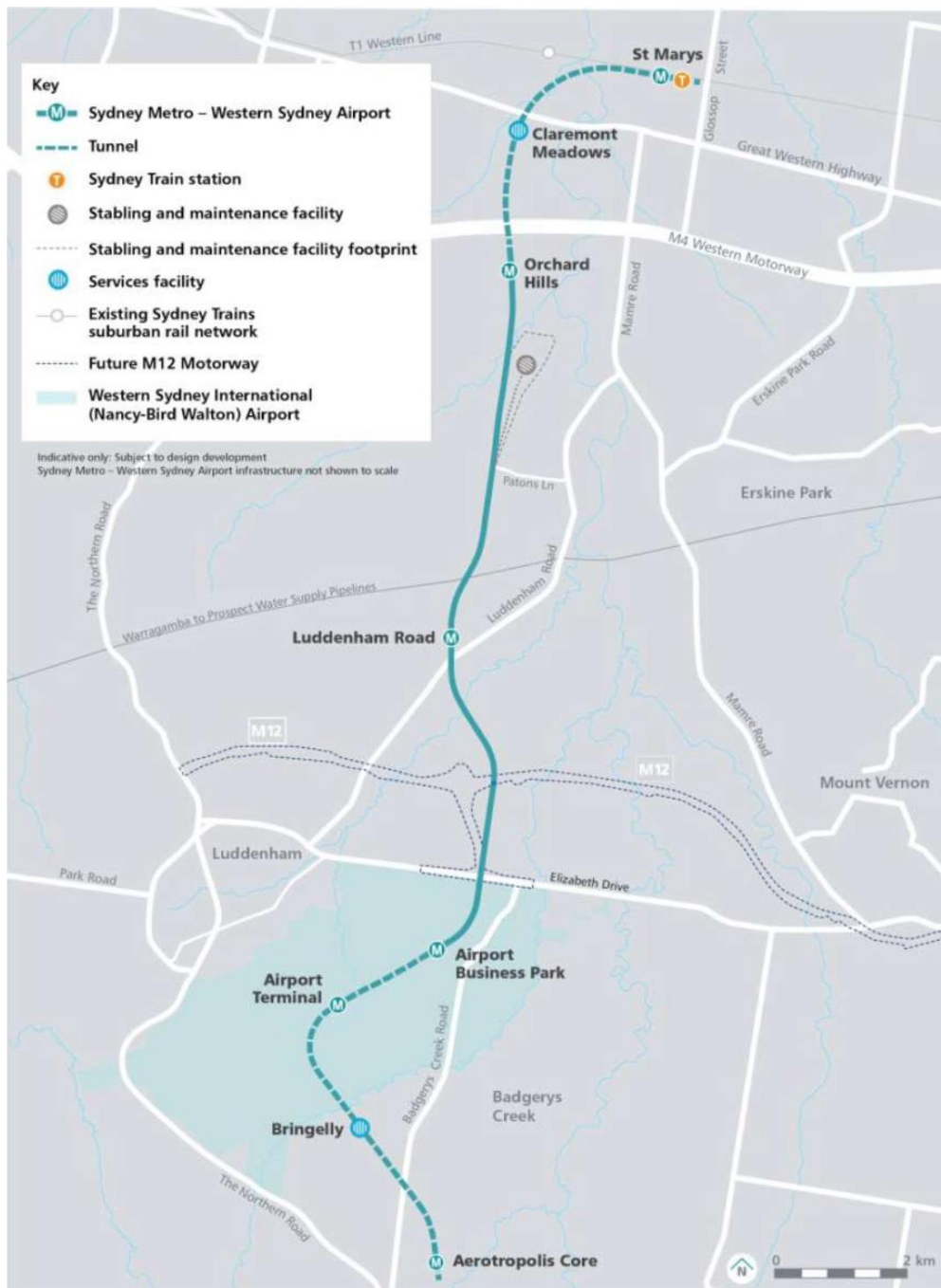


FIGURE 1 OVERVIEW OF SMWSA PROJECT

2 Objectives and Targets

In order to assess the environmental performance relating to noise and vibration during construction, environmental objectives and targets have been established. These objectives and targets have been developed to align with those established through the EIS and set out in the CEMF.

The environmental performance outcomes in relation to noise and vibration from the EIS (Chapter 10, 12 and 24) and Staging Report are:

- Construction noise and vibration impacts on local communities (including airborne noise and ground-borne noise and vibration) are managed in accordance with the CNVS, the Interim Construction Noise Guideline (ICNG) and the Airports Regulations
- Structural damage to buildings, heritage items and public utilities and infrastructure, including the Warragamba to Prospect Water Supply Pipelines, from construction vibration is to be avoided
- Impacts from vibration on non-Aboriginal heritage items and archaeology are minimised or where possible avoided
- Impacts on areas of archaeological sensitivity and significance are avoided or minimised, where practical
- Cumulative impacts are managed through coordination of construction activities and communication processes with nearby projects (Western Sydney International, M12 Motorway, The Northern Road, St Marys Intermodal and St Marys Commuter Car Park Expansion).

Section 8.1 of the CEMF provides objectives for the management of noise and vibration during construction. Table 1 lists those management objectives and identifies the targets and tools to be used by Parklife Metro D&C to meet those objectives.

TABLE 1 OBJECTIVES AND TARGETS

Objective	Target	Measurement Tool
Minimise unreasonable noise and vibration impacts on residents and businesses through implantation of applicable standards, guidelines and regulations	100% of weekly inspections are completed, targeting: • Noise and vibration controls • Worker behaviour • Respite periods being observed. 100% of NML exceedances detected in monitoring records are justified having regard to reasonable and feasible measures to avoid and mitigate those exceedances 100% of construction personnel attend project induction.	Tool box and induction attendance Site inspection Verification monitoring Internal and external audits
Avoid structural damage to buildings or heritage items as a result of construction vibration.	100% of condition surveys are completed, where required, prior to vibration intensive works being undertaken. Attended vibration monitoring of all vibration intensive works is completed, where those works are undertaken within the safe working distances to buildings and structures, including heritage items.	Building condition survey Monitoring records Site inspection
Undertake active community consultation.	100% of community notifications and consultation is completed.	Consultation records Complaints register
Maintain positive, cooperative relationships with schools, childcare centres, local residents and building owners.	100% of noise and vibration related community complaints are investigated and managed in accordance with Sydney Metro Construction Complaints Management System including timely response and close out.	

Performance of Parklife Metro D&C will be monitored against the targets in Table 1, which will be documented in the compliance reporting requirements outlined in Section 3.9 of the CEMP and will be undertaken at least on an annual basis. The general performance expectations are addressed throughout this NVMP and Noise and Vibration Monitoring Program (Appendix B).

3 Legal and Other Requirements

3.1 Relevant Legislation and Guidelines

Key legislation and guidelines relevant to this NVMP includes:

- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *Protection of the Environment Operations Act 1997* (POEO Act)
- Liverpool Environment Plan 2008 (Liverpool LEP)
- Penrith Environment Plan 2010 (Penrith LEP)
- NSW Interim Construction Noise Guideline (ICNG)
- Environmental Noise Management Manual (RTA, 2001)
- NSW Road Noise Policy (DECCW, 2011)
- Assessing vibration; a technical guideline (DEC, 2006)
- Transport for NSW (TfNSW) Construction Noise and Vibration Strategy (TfNSW CNVS)
- Noise Policy for Industry (NSW EPA, 2017).

The standards and guidelines relevant to noise and vibration management are summarised in Table 2 and additional applicable legislation is detailed in Section 3 of CEMP.

TABLE 2 RELEVANT GUIDELINES

Environmental Impact	Relevant standard or guideline
Airborne noise	• ICNG • CNVS • AS ISO 6393:2019 Earth-moving machinery — Determination of sound power level — Stationary test conditions • AS2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites
Sleep disturbance	• Construction noise – Noise Policy for Industry (NPfI) • CNVS • Road traffic noise – NSW Road Noise Policy (RNP) • RTA Environmental Noise Management Manual (ENMM) Practice Note 3
Ground-borne noise	• ICNG • Australian Standard AS/NZS 2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors
Construction related road traffic noise	• No specific guidelines, but guidance taken from the ICNG and the RNP • CNVS
Vibration (disturbance to building occupants)	• NSW DECC's Assessing vibration; a technical guideline, February 2006 • British Standard BS 6472-1:2008, Guide to evaluation of human exposure to vibration in buildings- Vibration sources other than blasting • AS2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites
Vibration (structural damage to buildings)	• British Standard 7385:1993 Evaluation and measurement of vibration in buildings – Part 2 Guide to damage from groundborne vibration • AS2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites
Vibration (heritage structures)	• German Standard DIN 4150-3:2016 – Vibration in Buildings Part 3: Effects on Structures • Guideline for Development Adjacent to the Upper Canal and Warragamba Pipelines (WaterNSW, Sep 2021) (Water NSW Guideline)
Vibration (human exposure)	• preferred vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure) • Australian Standard AS 2187.2 - 2006 "Explosives - Storage and Use - Use of Explosives" (for human exposure);

3.2 Project Requirements

The Conditions and CEMF requirements relevant to the development of this NVMP are listed in Table 3. Other requirements, including Conditions, REMMs and CEMF clauses relevant to this Plan, are included in Appendix A.

TABLE 3 COMPLIANCE TABLE - REQUIREMENTS FOR PREPARATION OF THIS NVMP

No.	Condition	Where addressed
SSI 10051 Infrastructure Approval (dated 23 July 2021)		
C1	Construction Environmental Management Plans (CEMPs) and CEMP Sub-plans must be prepared in accordance with the Construction Environmental Management Framework (CEMF) included in the documents listed in Condition A1 of this schedule to detail how the performance outcomes, commitments and mitigation measures specified in the documents listed in Condition A1 of this schedule will be implemented and achieved during construction.	This plan Section 1.2
C5	Of the CEMP Sub-plans required under Condition C1, the following CEMP Sub-plans must be prepared in consultation with the relevant government agencies identified for each CEMP Sub-plan. Details of issues raised by a government agency during consultation (as required by Condition A6) must be provided as part of the relevant CEMP Sub-Plan when submitted to the Planning Secretary / ER (whichever is applicable). Where a government agency(ies) request(s) is not included, the Proponent must provide the Planning Secretary / ER (whichever is applicable) justification as to why. a) Noise and vibration – relevant Councils and WaterNSW (in relation to its assets)	Section 3.5
C6	The CEMP Sub-plans must state how:	
	(a) the environmental performance outcomes identified in the documents listed in Condition A1 will be achieved;	Section 2
	(b) the mitigation measures identified in the documents listed in Condition A1 will be implemented;	Section 9
	(c) the relevant terms of this approval will be complied with; and	Section 10
	(d) issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed through SMART principles.	Section 9.4
C7	With the exception of any CEMP Sub-plans expressly nominated by the Planning Secretary to be endorsed by the ER, all CEMP Sub-plans must be submitted to the Planning Secretary for approval.	Section 3.6
C8	The CEMP Sub-plans not requiring the Planning Secretary's approval must obtain the endorsement of the ER as being in accordance with the conditions of approval and all relevant undertakings made in the documents listed in Condition A1. Any of these CEMP Sub-plans must be submitted to the ER with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before construction or where construction is staged no later than one (1) month before the commencement of that stage.	Section 3.6
C9	Any of the CEMP Sub-plans to be approved by the Planning Secretary must be submitted to the Planning Secretary with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before construction or where construction is staged no later than one (1) month before the commencement of that stage.	Section 3.6
C10	Construction must not commence until the CEMP and all CEMP Sub-plans have been approved by the Planning Secretary or endorsed by the ER (whichever is applicable), unless otherwise agreed by the Planning Secretary. The CEMP and CEMP Sub-plans, as approved by the Planning Secretary or endorsed by the ER (whichever is applicable), including any minor amendments approved by the ER, must be implemented for the duration of construction.	Section 3.6
Construction Environmental Management Framework		
3.4g(iii)	For each plan under the CEMP include a matrix of the relevant SSI Conditions of Approval referencing where each requirement is addressed	Appendix A
3.4g(iv)	For each plan under the CEMP, set objectives and targets, and identify measurable key performance indicators in relation to these	Section 2

3.3 IS Rating Tools Requirements

The Infrastructure Sustainability (IS) Council IS Rating Tool targets relevant to this NVMP are outlined in Table 4.

TABLE 4 IS RATING CREDITS RELEVANT TO THIS NVMP

ID	IS Rating Tool Requirement	Where addressed
Dis-2 L1	- Measures to mitigate noise during construction and operation have been identified and implemented - Monitoring of noise is undertaken at appropriate intervals and in response to complaints during construction	Sections 8 and 9 Appendix B
Dis-2 L2	- For construction, modelling and monitoring demonstrates no recurring or major divergences from the noise management process in ISCA approved noise guidelines - For operation, modelling demonstrates no recurring or major exceedances of noise goals	Section 8.2 Section 10.4 Note: This NVMP does not address operational impacts
Dis-3 L1	- Measures to mitigate vibration during construction and operation have been identified and implemented - Monitoring of vibration is undertaken at appropriate intervals and in response to complaints during construction	Sections 8 and 9 Appendix B
Dis-3 L2	- For construction, modelling and monitoring demonstrates no exceedances of vibration goals for structural damage to buildings and structures - For operation, modelling demonstrates no recurring or major exceedances of vibration goals for human comfort criteria - No physical damage has been caused to any buildings or structures by vibration caused by construction	Appendix B Operational impacts are not addressed in this construction plan.

3.4 Licenses and Permits

An Environment Protection Licence (EPL) for Railway activities – railway infrastructure construction is in the process of being obtained for the project and will be obtained prior to the commencement of the SSTOM Works. Noise and vibration management requirements prescribed by the EPL will be integrated into this Sub-plan and associated monitoring programs, where necessary, to ensure compliance.

In consultation with the NSW EPA for the application of the Project EPL (EPL #21807), it was discussed that all construction stage SSTOM Works on NSW land (State controlled land) would be subject to the EPL. Therefore, all OOHW would be managed in accordance with the EPL.

3.5 Document Consultation

Reflecting the requirements of Conditions A6, C5(a) and C6, this Sub-plan has been prepared in consultation with relevant Councils (Penrith City Council and Liverpool City Council), and WaterNSW, as shown in Table 5.

TABLE 5 SUB-PLAN AND MONITORING PROGRAM AGENCY CONSULTATION REQUIREMENTS

Plan	Consultation requirement
Noise and Vibration Management Sub-plan (Condition C5)	Relevant Councils (Penrith City Council and Liverpool City Council) and Water NSW (in relation to its assets)

A summary of this consultation is provided below in Table 6, while evidence of details of issues raised by stakeholders during consultation are provided in Appendix F, in accordance with Condition A6. The evidence in Appendix F also includes the consultation undertaken for the Noise and Vibration Monitoring Program, required in accordance with Condition C13.

TABLE 6 CONSULTATION LOG

Agency	Date consulted	Comments received	Discussion
Penrith City Council	29/03/2023	28/04/2023	Requested additional detail on monitoring locations, which will be provided in the DNVIS', which will be prepared in accordance with E47.
Liverpool City Council	29/03/2023	26/06/2023	In relation to the NVMP comments were made around the requirement for an EPL, which is discussed in Section 3.4
WaterNSW	05/04/2023	24/04/2023	WaterNSW raised various comments directly related to management and assessment of works around the Warragamba to Prospect Water Supply Pipelines, which have been considered and accepted where appropriate.

3.6 Document Approval

This Sub-plan and the Noise and Vibration Monitoring Program will be endorsed by the ER in accordance with Condition C7 and Condition C19, and submitted to the Planning Secretary for approval no later than one month prior to the commencement of construction.

Construction will not commence until the CEMP and all required Sub-plans and Monitoring Programs have been endorsed by the ER and/or approved by the Department of Planning and Environment (DPE). This Sub-plan will be implemented for the duration of construction.

4 Existing Environment

The existing noise and vibration characteristics of the area surrounding the SSTOM Works was assessed in the EIS, which grouped the existing noise environment into two groups, being areas north and south of the M4 Western Motorway.

Areas north of the M4 Western Motorway is identified as a mix of suburban and commercial landscapes, with the background noise dominated by road traffic noise, with pocked of industry and commercial related noise contributions around St Marys. The majority of sensitive receivers in the area north of the M4 Western Motorway are urban residential properties and daytime operating businesses.

The noise environment south of the M4 Western Motorway is characteristic of a semi-rural landscape, with background noise generally being natural sounds with little traffic noise. Therefore, these areas are associated with generally low background levels. Traffic noise is a contributing factor to background noise around Luddenham Road, Elizabeth Drive and The Northern Road. Most receivers in this area south of the M4 Western Motorway are rural or semi-rural residential properties.

The land use survey detailed in the EIS is provided in Appendix C, and informs this NVMP, including the existing environment and proposed controls and mitigation measures.

4.1 Noise Catchment Areas

Noise Catchment Areas (NCAs) are geographical groupings of receivers that are identifiable by their existing background noise environment, usually due to similar surrounding land use, and who are likely to experience similar impacts from the project. The NCAs are based on the EIS and predicted impacts for each NCA are considered to represent typical noise and vibration impacts at each individual receiver within that NCA. Table 7 describes the location of the NCAs applicable to the SSTOM Works, which are illustrated in the land use mapping provided in Appendix C.

TABLE 7 NOISE CATCHMENT AREAS

NCA	Description
NCA01	Medium density single and multistorey residential dwellings north of the project at St Marys. Ambient noise conditions are dominated by road and rail traffic noise from Glossop Street and Forrester Road, and the existing Sydney Trains suburban rail network. Includes commercial and industrial receivers along Kurrajong Road and Glossop Street.
NCA02	Predominantly industrial and commercial receivers located to the north St Marys Station and the project.
NCA03	Predominantly medium density single and multi-storey residential dwellings, with commercial receivers located along Queen Street. Ambient noise conditions are dominated by traffic along the existing heavy rail line through St Marys Station, and traffic along Queen Street.
NCA04	Medium density residential dwellings are grouped around Werrington Station to the north of the project, with Wollemi College and Cobham Detention to the west.
NCA05	Predominantly medium density single and multi-storey residential dwellings. Ambient noise conditions are dominated by traffic along Mamre Road.
NCA06	Predominantly medium density residential dwellings to the east of Gipps Street and south of Caddens Road. Ambient noise conditions are dominated by traffic along M4 Western Motorway and Gipps Street.
NCA07	Predominantly medium density single-storey residential dwellings, located to the east of the project. Ambient noise conditions are dominated by traffic along Mamre Road.
NCA08	Predominantly low-density single storey residential dwellings. East of the project is mostly open land with scattered receivers along Samuel Marsden Road and Lansdowne Road. Ambient noise conditions are dominated by traffic along the M4 Western Motorway.
NCA09	Open farmland and a grouping of low-density single storey residential dwellings within 1200 metres east of the project along Luddenham Road.
NCA10	Open farmland with low density single storey and multi-storey residential dwellings within the Twin Creeks area east of the project, and scattered residential dwellings along Luddenham Road.
NCA11	Predominantly Western Sydney International (on-airport) land. Low density residential dwellings along Lawson Road and Martin Road to the east of the project. Medium density residential dwellings at Luddenham to the west of the Project.
NCA12	Predominantly scattered low density single-storey residential dwellings, located either side of the project. Ambient noise conditions are dominated by traffic along The Northern Road.

4.2 Sensitive Receivers

The majority of sensitive receivers in this area north of the M4 Western Motorway are considered urban residential properties and daytime operating businesses.

Most receivers in the area south of the M4 Western Motorway are rural or semi-rural residential properties.

Non-residential sensitive receivers are also located around the SSTOM Works, which include:

- St Marys North Public School
- St Marys Anglican Church
- St Demetrios Orthodox Church
- Kurrambee School
- Mirrabooka Study Centre
- My First School Daycare Centre
- Koala Corner Children's Centre
- Claremont Meadows Public School
- Banks Public School
- Vines holiday cottages and Winnamatta Guest House.

The initial land use survey mapping sourced from the EIS is provided in Appendix C. In accordance with Condition E37 a detailed land use survey will 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, which will be completed in accordance with Condition E37 and included in the Detailed Noise and Vibration Impact Statements (DNVIS) required under Condition E47.

4.3 Ambient Noise Environment

Baseline noise levels were established as part of the Project EIS (Technical Paper 2, Part 1) through unattended background noise monitoring at representative locations. The baseline information was used to establish the Rating Background Level (RBL), which represents the average minimum background sound level for each measurement period, averaged over the measurement days. The RBL at each NCA is provided in Table 8.

TABLE 8 BACKGROUND NOISE

NCA	Monitoring location	Rating Background Level (RBL) dB(A) ¹			Ambient noise level dB(A) ¹ L_{eq} 15min		
		Day	Evening	Night	Day	Evening	Night
01	NM01	38	(41) 38 ³	(40) 38 ³	53	53	50
03	NM02	37	(40) 37 ³	36	55	59	51
03	NM03	38	32	31	50	41	46
10	NM04*	-	-	-	-	-	-
05	NM05	40	(44) 40 ³	(44) 40 ³	54	51	50
07	NM06	42	(44) 42 ³	38	59	57	52
06	NM07	37	37	36	48	49	45
08	NM08	31	(32) 31 ³	30	52	48	40
09	NM09	40	39	34	61	57	54
10	NM10	(30) 35 ²	30	30	47	42	37

NCA	Monitoring location	Rating Background Level (RBL) dB(A) ¹			Ambient noise level dB(A) ¹ Leq 15min		
		Day	Evening	Night	Day	Evening	Night
11	NM11*	-	-	-	-	-	-
11	NM12	(34) 35 ²	32	(24) 30 ²	58	60	48
12	NM13	38	35	34	58	52	51
04	NM14	35	32	31	48	47	43
08	NM15	44	(47) 44 ³	40	55	53	50
07	NM16	47	42	(28) 30 ²	59	56	54
03	NM17	54	50	36	63	62	59
06	NM18	42	(43) 42 ³	39	55	53	52
07	NM19	53	48	36	62	59	57
11	NM20	39	37	(28) 30 ²	49	47	42

(1) Time periods defined as – Day: 7am to 6pm Monday to Saturday, 8am to 6pm Sunday; Evening, 6pm to 10pm; Night 10pm to 7am Monday to Saturday, 10pm to 8am Sunday

(2) Where background levels are below the minimum assumed rating background noise levels outlined in the NPfI, they have been adjusted to 35dBA during the day period, and 30 dBA during the evening and night periods in accordance with the NPfI

(3) Where evening or night background noise levels exceed that of the previous period, they have been set at the background noise level of the previous period, in line with the NPfI, to reflect community's expectation for greater noise control during more sensitive periods

* Noise monitoring not undertaken due to site access constraints

5 Construction Hours

The approved construction hours for the works are in accordance with Conditions E38 and E39, and the CNVS. These are summarised in Table 9.

TABLE 9 STANDARD CONSTRUCTION HOURS

Condition	Activity	Monday to Friday	Saturday	Sunday / Public Holiday
E38	Standard construction hours	7:00am to 6:00pm	8:00am to 1:00pm	At no time
E39	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:	8:00am to 6:00pm	8:00am to 1:00pm	At no time
		If continuously*, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour. *continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work		

Where possible, works will be completed during the standard construction hours prescribed in Condition E38, as summarised in Table 9. Where out of hours works are planned, Parklife Metro D&C would undertake an assessment of the works, in accordance with the OOHW Protocol in Appendix D or in accordance with the EPL. Where works are planned OOH that may exceed the NML or other criteria, a DNVIS will be prepared in accordance with Condition E47, as described in Section 8.2. The assessment of Out-of-Hours Works would determine the risk of potential noise impacts associated with the works. Consideration of that risk would include the proposed timeframe of the works, which, in accordance with the CNVS, would class the impact for the following timeframes as:

- Lower Impact: 6:00pm till 10:00pm weekdays, 1:00pm till 10:00pm Saturdays and 8:00am till 6:00pm Sundays or Public Holidays
- Moderate Impact: 10:00 pm to 7:00 am Weekday Nights 10:00 pm to 8:00 am Saturdays
- Higher Impact: 6.00 pm to 7.00 am Sundays and Public Holidays.

Detail on works permitted to be undertaken outside the approved construction hours (OOHW) are included in Table 10.

TABLE 10 WORKS PERMITTED OUTSIDE STANDARD WORKING HOURS

Condition	Description of Work
E41	Works may be carried out outside the standard construction hours in the following circumstances:
a)	Safety and Emergencies i) for the delivery of materials required by the NSW Police 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 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)
c)	By Approval i) where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or

Condition	Description of Work
	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
d)	Prescribed Activity i) tunnelling and ancillary support activities (excluding cut and cover tunnelling and surface works not directly supporting tunnelling) are permitted 24 hours a day, seven days a week; or ii) grout batching at the Orchard Hills construction site is permitted 24 hours per day, seven days per week; or iii) delivery of material that is required to be delivered outside of standard construction hours in Condition E38 to directly support tunnelling activities, except between the hours 10:00 pm and 7:00 am to / from the Orchard Hills ancillary facility; or iv) haulage of spoil generated through tunnelling is permitted 24 hours per day, seven days per week except between the hours of 10:00 pm and 7:00 am to / from the Orchard Hills construction site; or v) works within an acoustic enclosure are permitted 24 hours a day, seven days a week where there is no exceedance of noise levels or intermittent vibration levels under Low impact circumstances identified in Condition E41(b), unless otherwise agreed with the Planning Secretary; or vi) tunnel and underground station box fit out works are permitted 24 hours per day, seven days per week.

In accordance with Condition E42, an Out-of-Hours Work Protocol (OOHWP) has been prepared, which identifies the process for the consideration, management and approval of works which are outside the approved construction hours, where those works are not subject to an EPL. The Protocol has been prepared by Sydney Metro and was approved by the Planning Secretary in accordance with Condition E42, prior to commencement of any out of hours works. The OOHWP is discussed in Section 8.3 and is provided in Appendix D.

In accordance with Condition E56, OOHW undertaken by third parties (such as utility relocations), must be coordinated to the greatest extent possible to ensure respite periods are provided, this includes:

- 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 (refer to Section 9.3.1), or
- b) consider the provision of alternative respite or mitigation to impacted noise sensitive land use(s).

In such cases evidence will be provided to the ER in support of any decision made in relation to the management and implementation of respite or mitigation.

Approval from the EPA via the Environment Protection Licence (EPL) will be obtained for out of hours works (OOHW) in accordance with Condition E41(c)(i). Activities that may require OOHW either via the EPL or in accordance with the Sydney Metro OOHWP Protocol are discussed further in Section 7.1.

6 Noise Management Levels and Vibration Criteria

6.1 Airborne Noise

Based on the ICNG and CNVS methodology, Table 11 provides the project-specific construction Noise Management Levels (NMLs) for residential receivers nearby the development.

TABLE 11 ICNG NOISE MANAGEMENT LEVELS

Time of Day	NML, dBA L eq, 15 min	Application
Standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm	Noise affected RBL + 10 dB	Where the predicted or measured LAeq (15 min) is greater than the noise affected level, Parklife Metro D&C will apply all feasible and reasonable work practices to meet the noise affected level
No work on Sundays or public holidays	Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise
Outside recommended standard hours	Noise affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours Parklife Metro D&C will apply all feasible and reasonable work practices to meet the noise affected level

6.1.1 Sleep Disturbance

Construction noise during the night (10pm to 7am – Monday to Saturday, 10pm to 8am – Sunday) has the potential to awaken residents from sleep. The CNVS approach to managing events that cause sleep disturbance has been adopted for this NVMP, and is consistent with the Noise Policy for Industry (EPA, 2017).

A detailed maximum noise level event assessment is to be undertaken when night time noise levels at a residential receiver are predicted to exceed:

- LAeq,15min 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- LAFmax 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.

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 will be based on the LAFmax 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 noise levels below the sleep disturbance trigger levels for night-time activities.

The assessment of LAeq,15 minute against the prevailing RBL plus 5 dB aligns with construction NMLs for night time periods, and would therefore already be managed as the NML. Therefore, sleep disturbance and awakening external noise level screening levels of RBL+15 dB and LAFmax 65 dB(A) (awakening criteria), whichever is most conservative (lowest) within each NCA, has been adopted and provided for each NCA in Table 12.

6.1.2 Noise Management Levels for Residential

NMLs for residential receivers within each NCA are derived from EIS Technical Paper 2 (Table 4-9) and are provided in Table 12. NMLs apply at the most noise-affected locations within the property boundary and at a height of 1.5m above ground level. If the property boundary is more than 30m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30m of the residence.

TABLE 12 NOISE MANAGEMENT LEVELS AND SLEEP DISTURBANCE

NCA	Noise Management Level dB(A)				
	Standard hours ¹ (LA _{eq} (15 minute))	OOH – Day ² (LA _{eq} (15 minute))	OOH – Evening ² (LA _{eq} (15 minute))	OOH – Night ² (LA _{eq} (15 minute))	Sleep Disturbance ³ (LAF _{max})
NCA01	48	43	43	43	53
NCA02	75	42	42	41	52 ⁴
NCA03	47	42	42	41	52 ⁴
NCA04	45	40	37	37 ^{4,5}	52 ⁴
NCA05	50	45	45	45	55
NCA06	47	42	37	37 ^{4,5}	52 ⁴
NCA07	57	52	47	40 ⁴	52 ⁴
NCA08	54	49	49	45	55
NCA09	50	45	44	40 ⁴	52 ⁴
NCA10	45	40	35	40 ⁴	52 ⁴
NCA11	49	44	42	40 ⁴	52 ⁴
NCA12	48	43	40	40 ⁴	52 ⁴

¹ Standard construction hours are 7am to 6pm (Mon to Fri) and 8am to 1pm (Sat)

² Out-of-hours (OOH): OOH Day from 1pm to 6pm Saturday; 8 am to 6 pm Sunday and Public holidays; OOH Evening from 6 pm to 10 pm Monday to Saturday and 6pm to 10pm Sunday; OOH Night from 10pm to 7am Monday to Friday, and from 10pm to 8am Saturday, Sunday and Public holidays

³ Sleep disturbance criteria applicable to OOH Night period

⁴ Sleep disturbance criteria of LAF_{max} 52 dB(A) has been adopted as the sleep disturbance criteria

⁵ Where evening or night NMLs exceed that of the previous period, they have been set at the NML of the previous period, in line with the NPfI, to reflect community's expectation for greater noise control during more sensitive periods

6.1.3 Other Sensitive Receivers

NMLs adopted for sensitive receivers other than residential land uses are presented in Table 13. These NMLs are based on the criteria provided in the ICNG for industrial, offices and rental space are for external areas.

In accordance with Condition 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 will be timetabled so as to avoid sensitive periods, unless other reasonable arrangements have been made at no cost to the affected institutions.

TABLE 13 ICNG CONSTRUCTION NOISE MANAGEMENT LEVELS AT OTHER SENSITIVE RECEIVERS

Land Use	Noise Management Level (External) L _{eq} , 15 min–dB(A)
Educational	55 ¹
Commercial (offices, retail outlets)	70
Commercial (industrial)	75
Active recreation	65
Passive recreation	60
Place of worship	55 ¹
Childcare centres	55 ¹

¹ An internal to external correction of +10 dB has been applied as per the ICNG.

6.1.4 Maximum Allowable Plant Sound Power Levels

Plant or equipment utilised on site during construction of the SSTOM Works will have a Sound Power Level (SWL) which is no higher than the corresponding SWL provided below in Table 14, unless justified and approved by the Parklife Metro D&C Environment Manager, in consultation with Sydney Metro and ER. The SWLs provided in Table 14 have been sourced from Appendix B-2 of the EIS Technical Working Paper 2 – Noise and Vibration (October 2020), and any additional equipment identified to be used throughout construction will be assessed as part of the DNVIS applicable to the use of that equipment.

TABLE 14 MAXIMUM ALLOWABLE SOUND POWER LEVELS FOR CONSTRUCTION EQUIPMENT

Activity	Maximum allowable Sound Power Levels (LAeq)
Articulated Dump Truck (30t)	109
Articulated Dump Truck (40t)	110
Asphalt Paver	114
Backhoe (large)	111
Body Truck/Semi Trailer/Water truck	108
Compressor (approx. 1500 CFM)	109
Compressor (approx. 600 CFM)	109
Concrete Batch Plant	108
Concrete Pump	109
Concrete Saw	118 ¹
Concrete Truck	109
Concrete Vibrator	113
Diesel Water Pump	106
Dozer (equiv. CAT D11)	121
Dozer (equiv. CAT D8)	116
Dozer (equiv. CAT D9)	116
Dump Truck (40t)	110
Elevated Work Platform	97
Excavator (approximately 10 tonne)	100
Excavator (approximately 6 tonne)	95
Excavator (approximately 20 tonnes)	105
Excavator (approximately 30 tonnes)	110
Excavator (approximately 40 tonnes)	115
Excavator Rocksaw	122 ¹
Frontend Loader (20t 3.5m ³ bucket)	112
Gantry Crane	97
Grader (14M)	113
Grader (16M)	113
Jack hammer (Hand held)	118 ¹
Large Hydraulic Hammer (1600 kg - 18 to 34 tonne excavator)	122 ¹
Lighting Tower	80
Medium Hydraulic Hammer (900 kg - 12 to 18 tonne excavator)	118 ¹

Activity	Maximum allowable Sound Power Levels (LAeq)
Mobile/Crawler Crane <200 tonne	113
Mobile/Crawler Crane >200 tonne	116
Multi-service vehicle (assume truck 40t)	116
Pile Boring Rig < 800 mm diameter	112
Pile Boring Rig > 800 mm diameter	112
Silenced Generator	92
Site Light Vehicle	99
Skidsteer Loaders (approx. 1 tonne)	110
Small Generator	103
Small Hydraulic Hammer (300 kg - 5 to 12t excavator)	115 ¹
Telehandler/Forklift (assumed telehandler)	106
Vacuum Truck	109
Vibratory Ripper (20-40t excavator)	105 ¹
Vibratory roller (Typically 4-6 tonnes)	103
Vibratory roller (Typically 13-18 tonnes)	109
Vibratory roller (Typically 2-4 tonnes)	101
Vibratory roller (Typically 7-13 tonnes)	109
Water Cart (Articulated truck)	107

¹ Plant item identified as having 'annoying' characteristics, and hence incurs a +5dB penalty

6.2 Ground-Borne Noise Criteria

Ground-borne noise is generated by vibration transmitted through the ground and into a structure. Ground-borne noise NMLs for residences are nominated in the ICNG and CNVS and indicate when management actions will be implemented. Mitigation measures will be applied when residential ground-borne noise NMLs are exceeded in accordance with Condition E44. Table 15 sets out the ground-borne noise management levels for residential receivers. These levels are applicable when ground-borne noise levels are higher than airborne noise levels during the evening and night periods.

TABLE 15 GROUND-BORNE NML - RESIDENTIAL

Period	Time of Day	NML Leq,15min
Evening	6pm to 10pm	40 dB(A)internal
Night	10pm to 7am	35 dB(A)internal

6.3 Construction Road Traffic Noise

The CNVS refers to the EPA (2011) Road Noise Policy (RNP) for guidance on the assessment of noise impacts on sensitive receivers from additional road traffic generated by the project operating on a public road network. Where vehicles operate within the boundaries of a construction site, noise impacts generated by these vehicles are included in the overall construction site noise emissions undertaken in line with the ICNG (and measured as LAeq,15min).

The CNVS states that 'an initial screening test should first be applied by evaluating whether noise levels will increase by more than 2 dBA due to construction traffic or a temporary reroute due to a road closure. Where increases are 2 dBA or less then no further assessment is required'. Therefore, if the road traffic noise levels increase by more than 2 dBA as a result of the proposed construction traffic, and the criteria in Table 16 are exceeded, investigation of mitigation options would be required.

TABLE 16 ROAD TRAFFIC NOISE CRITERIA

Road Type	Road traffic noise criteria	
	Day 7am to 10pm	Night 10pm to 7am
Freeway/Arterial/Sub-arterial	60 Leq,15hr dBA	55 Leq,9hr dBA
Local roads	55 L eq,15hr dBA	50 L eq,1hr dBA

The EIS determined that construction road traffic noise levels were not predicted to exceed relevant RNP noise criteria at the majority of project affected roads, with the exception of receivers at Kent Road at night and Badgerys Creek Road at day and night periods. These exceedances were associated with peak spoil movement, and would be lessened with on site reuse. SSTOM Works do not include bulk spoil movements, and would therefore be unlikely to trigger the RNP 2dBA screening level. This will be confirmed via detailed assessment undertaken as part of the DNVIS preparation.

6.4 Vibration Criteria

Condition E43 requires that the project be constructed with aim of achieving the following vibration criteria:

- Assessing vibration: a technical guideline (DEC, 2006) – for human exposure
- BS 7385 Part 2-1993 'Evaluation and measurement for vibration in buildings Part 2' as they are applicable to Australian conditions
- The vibration limits set out in the German Standard DIN 4150-3: Structural Vibration – effects of vibration on structures (for structural damage).

6.4.1 Buildings and Structures

Condition E43 specifies *German Standard DIN 4150-3: Structural vibration – Effects of vibration on structures* (DIN 4150) for structural damage. It is noted that the CNVS refers the EPA's *Assessing Vibration: A technical guideline* (AVTG) which recommends the use of *British Standard BS 7385-2: Evaluation and measurement for vibration in buildings Part 2*. As the DIN 4150 provides the more conservative guidance, adoption of DIN 4150, as recommended, results in compliance with the CNVS references.

Table 17 summarises the recommended limits outlined in DIN 4150 to ensure minimal risk of cosmetic damage to residential and industrial buildings, which is applicable to vibration in horizontal plane of the highest floor of the building at all frequencies.

TABLE 17 VIBRATION SCREENING CRITERIA FOR COSMETIC DAMAGE

Type of building	Peak component particle velocity (PPV)
Buildings used for commercial purposes, industrial buildings, and buildings of similar design Reinforced or framed structures	10 mm/s
Dwellings and buildings of similar design and/or occupancy Unreinforced or light framed structures	5 mm/s
Buildings categorised as structurally unsound and are of great intrinsic value (eg heritage listed buildings)	2.5 mm/s

NOTE: Heritage buildings and structures would be assessed as per the screening criteria in Table 17 as they should not be assumed to be more sensitive to vibration unless they are found to be structurally unsound.

At locations where the predicted and/or measured vibration levels are greater than shown above, and when representative monitoring has not already been undertaken, vibration monitoring will be performed during construction for that activity. 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.

6.4.2 Human Comfort

The CNVS discusses the use of AVTG, and *British Standard 6472-1992 "Guide to evaluation of human exposure to vibration in building"*, when assessing vibration impacts in relation to human comfort. AVTG presents preferred and maximum vibration values, above which there is considered to be a risk (low probability) that the amenity and comfort of people occupying buildings would be

adversely affected. The preferred vibration values are not mandatory limits but will aim to be achieved through application of all feasible and reasonable mitigation measures.

The applicable vibration dose values (VDV) for intermittent vibration are shown in Table 18.

TABLE 18 VIBRATION DOSE VALUES FOR HUMAN EXPOSURE TO INTERMITTENT VIBRATION

Location	Time	Vibration dose (m/s ^{1.75})	
		Preferred value	Maximum value
Residences	Day	0.20	0.40
	Night	0.13	0.26
Offices, schools, educational institutions, and places of worship	Anytime	0.40	0.80
Workshops	Anytime	0.80	1.60

The vibration guideline also specifies limits for continuous and impulsive vibration. These summarised vibration limits are expressed in acceleration (m/s²) and PPV (mm/s) as presented in Table 19. When short-term works such as piling, demolition and construction give rise to impulsive vibrations, undue restriction on vibration values may significantly prolong these operations and result in greater annoyance. Where work is short term, feasible and reasonable mitigation measures have been applied, then higher vibration values may apply. Through consultation with WaterNSW, clarification is noted that this short term allowance for higher vibration levels is referring to human comfort impacts and not to vibration levels experienced by structures, especially those structures sensitive to vibration.

TABLE 19 PREFERRED AND MAXIMUM VALUES FOR CONTINUOUS AND IMPULSIVE VIBRATION

Location	Assessment period	RMS Acceleration (m/s ²)				Peak Particle Velocity (mm/s)	
		Preferred values		Maximum values		Preferred values	Maximum values
		Z-Axis	X and Y axis	Z-Axis	X and Y axis		
Continuous vibration							
Critical areas	Day or night-time	0.0050	0.0036	0.010	0.0072	0.14	0.28
Residences	Daytime	0.010	0.0071	0.020	0.014	0.28	0.56
	Night-time	0.007	0.005	0.014	0.010	0.20	0.40
Offices, schools, educational, places of worship	Day or night-time	0.020	0.014	0.040	0.028	0.56	1.1
Workshops	Day or night-time	0.040	0.029	0.080	0.058	1.1	2.2
Impulsive vibration							
Critical areas	Day or night-time	0.0050	0.0036	0.010	0.0072	0.14	0.28
Residences	Daytime	0.3	0.21	0.60	0.42	8.6	17.0
	Night-time	0.10	0.071	0.20	0.14	2.8	5.6
Offices, schools, educational, places of worship	Day or night-time	0.64	0.46	1.28	0.92	18.0	36.0
Workshops	Day or night-time	0.64	0.46	1.28	0.92	18.0	36.0

6.4.3 Vibration Sensitive Structures

Heritage-listed structures should not be assumed to be more sensitive to vibration unless they are structurally unsound, which is unlikely for a regularly maintained structure. Where a historic structure is deemed to be sensitive to damage from vibration following inspection by qualified structural and/or civil engineers, more conservative superficial cosmetic damage criterion (2.5mm/s PPV) should be considered, as noted in Table 17. Building condition surveys would initially identify buildings and structures that can be categorised and structurally unsound, which would be confirmed through further inspection and investigation, which would then have the conservative vibration criteria applied.

In accordance with REMM NAH8, a dilapidation survey of the Warragamba to Prospect Water Supply Pipelines has been completed by Sydney Metro. Prior to commencement of SSTOM Works, Parklife Metro D&C would consult with WaterNSW regarding design, construction and operational management where the proposal interacts with the Warragamba to Prospect Water Supply Pipeline, in accordance with Condition E121. Construction and operational agreements with WaterNSW would be consistent with the "Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines (WaterNSW, Sep 2021)".

Through consultation with WaterNSW the vibration criteria to be applied to the Warragamba to Prospect Water Supply Pipelines will be consistent with the German Standard DIN 4150-3:2016 'Structural Vibration Part 3: Effects of Vibration in Structures'. Specifically, the maximum allowable limit of vibration acceptable at the water supply infrastructure are those listed in line 3 of Table 1 of the DIN4150-3, which has been provided in Figure 2.

Table 1 — Guideline values for vibration velocity, $v_{i, \max}$, for evaluating the effects of short-term vibration on structures						
-	Type of structure	Guideline values for $v_{i, \max}$ in mm/s				
		Foundation, all directions, $i = x, y, z,$ at a frequency of			Topmost floor, horizontal direction, $i = x, y$	Floor slabs, vertical direction, $i = z$
		1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz ^a	All frequencies	All frequencies
Column Line	1	2	3	4	5	6
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20 to 40	40 to 50	40	20
2	Residential buildings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15	20
3	Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (e.g. listed buildings)	3	3 to 8	8 to 10	8	20 ^b
NOTE Even if guideline values as in line 1, columns 2 to 5, are complied with, minor damage cannot be excluded.						
^a At frequencies above 100 Hz, the guideline values for 100 Hz can be applied as minimum values.						
^b Paragraph 2 of 5.1.2 shall be observed.						

FIGURE 2 EXCERPT (TABLE 1) FROM THE GERMAN STANDARD DIN 4150-3:2016

In accordance with Condition E82, the SSTOM Works will be designed and constructed with the objective of minimising impacts to, and interference with, third party property and infrastructure, and that such infrastructure and property is protected during construction. Examples of infrastructure may include gas pipelines, sewer pipes, and fibre optic cables close to the SSTOM Works may be sensitive to vibration.

In lieu of specific vibration criteria being provided by the asset owner of buried pipework, screening criteria would be adopted from guidance provided in DIN 4150-3 for buried pipework. The screening criteria is outlined in Table 20.

TABLE 20 GUIDELINE VALUES FOR VIBRATION VELOCITY CRITERIA ON BURIED PIPEWORK

Pipe material	Guideline values (measured on pipe) in mm/s
Steel (including welded pipes)	100
Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80
Masonry, plastic (including fibre optic cable casing)	50

NOTE: The guideline values provided in this table do not apply to Warragamba to Prospect Water Supply Pipelines.

In all cases, protection requirements or alterations to services will be determined by negotiation with the service providers as required by Condition E83. This will be managed in accordance with the specific process of the asset owner, and as identified in the Project Interface Management Plan. Disruption to services resulting from construction will be avoided, wherever possible, and advised to customers where it is not possible.

6.4.4 Minimum Working Distances

Certain construction activities require the use of vibration intensive equipment that may result in adverse vibration impacts. Minimum working distances to sensitive receivers for cosmetic damage and for human response have been identified for vibration intensive equipment. Where equipment is operating closer to a sensitive receiver, vibration from construction works may exceed the vibration guidelines provided in Table 17 to Table 19. Table 21 presents the vibration intensive equipment and the associated minimum working distances.

TABLE 21 RECOMMENDED MINIMUM WORKING DISTANCES FOR VIBRATION INTENSIVE PLANT FROM SENSITIVE RECEIVER

Plant item	Rating	Minimum working distance (m)	
		Cosmetic damage (BS 7385)	Human response (DECC 2006)
Pile Boring Rig	> 800 mm diameter	3	20
	< 800 mm diameter	3	20
Vibratory Pile Driver	Sheet piles	27	20
Hydraulic hammer	Small (300kg 5-12t excavator)	2	7
	Medium (900kg 12 – 18t excavator)	7	23
	Large (1600kg 18-34t excavator)	22	73
Jackhammer	handheld	2	n/a
Vibratory roller	2-4 tonnes	8	20
	4-6 tonnes	16	40
	7-13 tonnes	20	100
	13-18	27	100
	>18 tonnes	35	100

7 Environmental Aspects and Impacts

7.1 Construction Activities

The construction activities associated with delivery of SSTOM Works that have a high potential to result in noise and vibration impacts are provided below in Table 22, and will be further refined and investigated in the DNVIS, in accordance with Condition E47.

No blasting will be undertaken nor are there sheds proposed to be designed and constructed as part of the SSTOM Works.

TABLE 22 KEY NOISE AND VIBRATION GENERATING ACTIVITIES

Stage	Key noise and vibration generating activities (to be refined in DNVIS)
Investigations and survey	Site investigations requiring ground disturbance (eg. Geotechnical testing)
Site establishment and local area works	- Erection of site fencing and hoarding - Local road works and traffic changes, using excavators with hammer attachments and construction works. - Placement of pavements for temporary road diversions - Installation of site offices and amenities
Underground Stations: St Marys Aerotropolis	- Piling and ground improvements - Earthworks and haulage - Steel fixing and welding - Formwork - Concrete pumping placement and finishing - Construct portal canopy structure - Construction of station including install of precast sections, such as beams, slabs and column, and install of lifts and escalators, services, etc
Stations at Grade or in Cut: Orchard Hills	- Piling and ground improvements - Earthworks and haulage - Steel fixing and welding - Formwork - Concrete pumping placement and finishing - Construct portal canopy structure - Construction of station including install of precast sections, such as beams, slabs and column, and install of lifts and escalators, services, etc
Elevated Station: Luddenham Road	- Piling and ground improvements - Spoil management - Install temporary works such as scaffolding and working platforms - Structural steel erection of platform structure - Construct cantilever canopy structure - Steel fixing and welding - Concrete pumping placement and finishing - Construction of station including install of precast sections, such as beams, slabs and column, and install of lifts and escalators, services, etc - Install HV/LV Comms cabling to ladder/trays
Stabling and maintenance facility	- Construct substation and install services (HV electrical, drainage, water, etc) - Construct retaining walls - Earthworks - Road and building pad construction - Form, reinforce and pour concrete building slabs - Construct/Erect portal structure to buildings - Place ballast - Install ballast track rail and sleeper including installation of points

Stage	Key noise and vibration generating activities (to be refined in DNVIS)
Intermediate Service Shafts: Claremont Meadows Bringelly	• Steel fixing and welding • Formwork • Concrete pumping placement and finishing • Construct ring beam, head wall, perimeter wall lining and tunnel extension with cross passage • Waterproofing and grouting • Backfill and compact engineered fill to shaft • Landscaping to surface
Linewide Works	• Concrete works • Install track slab block and cage • Welding and positioning rail • Boundary and perimeter fencing • Install structural steel mast, outrigger, and overhead catenary • Landscaping of formation • Install combined service route • Construct Accessible Transport Corridor (ATC) (shared use pathway) • Construct ATC bridges at waterways • Install Security provisions and cameras • Rail grinding • Train testing and commissioning

During construction other activities will trigger the requirement for an OOHW application, either via the EPL or in accordance with the OOHW Protocol. Key examples include:

- Essential local area and utility works which cannot be performed during standard hours and require a road occupancy licence and/or disruption to services that is minimised by undertaking night works
- Works that are required to have extended hours to achieve overarching project technical requirements, such as concrete works
- Delivery of materials that cannot be delivered during standard construction hours due to access restrictions or oversize loads.

A detailed description of the construction activities will be included in each DNVIS. An indicative construction program identifying start and end dates for the SSTOM Works is provided in Table 23.

TABLE 23 INDICATIVE CONSTRUCTION PROGRAM

Construction Phase	2023				2024				2025				2026			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Site Establishment																
Construction of Stabling and Maintenance Facility (SMF)																
Stations Construction																
Station Precinct Construction																
Linewide Works: Trackwork, Rail Infrastructure and Systems																
Testing and Commissioning																

7.2 Noise and Vibration Impacts

7.2.1 Highly Noise Affected

The EIS outlined the highest noise levels predicted at a residential receiver in each NCA, which also identified potential highly noise affected receivers from SSTOM Works. The predicted noise levels provided in the EIS are representative of the 'typical' expected noise levels, and are representative of the 'worst case' expected noise levels reflecting full utilisation of plant. During standard hours, all NCAs are predicted to experience some exceedances of NMLs. In accordance with Condition E49 mitigation measures will be implemented with the aim of reducing typical case construction noise below the highly noise affected criteria at each relevant receiver. Receivers identified as high noise affected during typical-case construction is summarised in Appendix B of the Project Planning Approval (SSI-10051) and shown in Figure 3 to Figure 6.

Table 24 below provides a summary of the highest predicted noise levels during 'typical' and 'worst case' day time scenarios applicable to SSTOM Works. The applicable scenarios, as described in the EIS, include:

- Scenario 5 (SC05) – Station construction
- Scenario 6 (SC06) – Construction of stabling and maintenance and other ancillary facilities
- Scenario 7 (SC07) – Rail systems fitout
- Scenario 8 (SC08) – Station fitout, precinct and transport integration works
- Scenario 9 (SC09) – Finishing works.

Construction noise levels will be predicted for all works required by the CNVS. In accordance with Condition E47, a DNVIS would be prepared where predictions indicate noise levels would be above the NMLs, vibration criteria and/or ground-borne noise levels at any residence outside standard construction hours, or where receivers will be highly noise affected. Refer to Section 8.2 for more detail regarding the DNVIS process.

TABLE 24 HIGHEST PREDICTED NOISE LEVEL – TYPICAL AND (WORST CASE)

NCA	NML	Highest predicted noise level (dB)				
		SC05	SC06	SC07	SC08	SC09
01	48	50 (56)	53 (63)	-	59 (63)	62 (68)
02	75	-	-	-	-	-
03	47	65 (71)	68 (78)	-	74 (78)	77 (83)
04	45	64 (72)	49 (59)	-	55 (59)	61 (67)
05	50	60 (68)	48 (58)	55 (59)	54 (58)	61 (66)
06	47	69 (77)	54 (56)	63 (67)	63 (67)	71 (77)
07	57	55 (63)	61 (63)	62 (66)	54 (56)	61 (65)
08	54	70 (78)	68 (70)	77 (81)	65 (69)	78 (82)
09	50	51 (55)	67 (69)	67 (71)	60 (62)	65 (68)
10	45	64 (67)	40 (72)	69 (70)	62 (68)	68 (72)
11	49	54 (61)	-	57 (58)	61 (68)	59 (63)
12	48	65 (72)	-	-	70 (77)	59 (67)

NOTE: Results in brackets indicate noise level predictions assuming full utilisation of plant (i.e. realistic worst case).

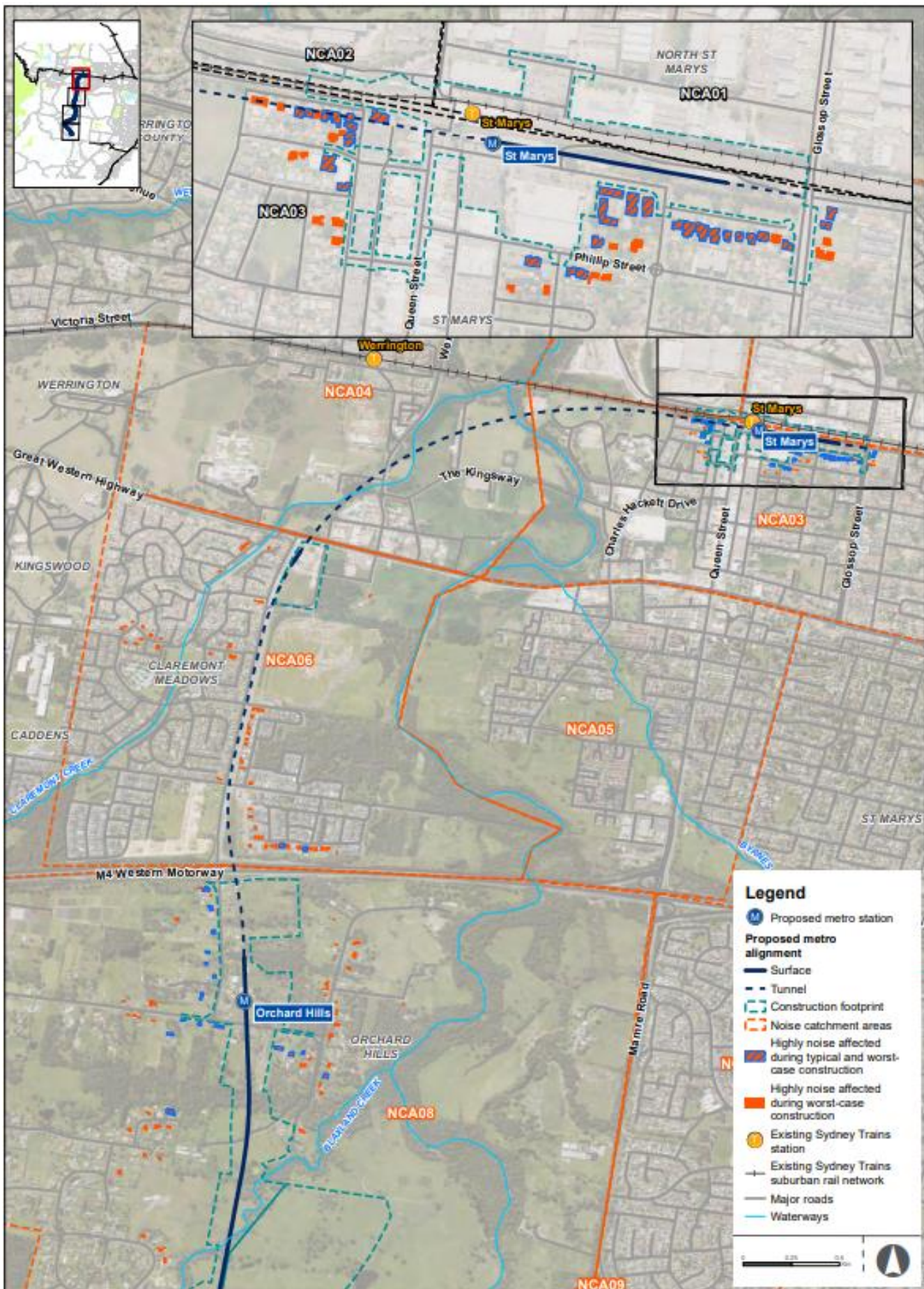


FIGURE 3 RESIDENTIAL RECEIVERS POTENTIALLY EXCEEDING HIGHLY NOISE AFFECTED DURING TYPICAL ACTIVITIES

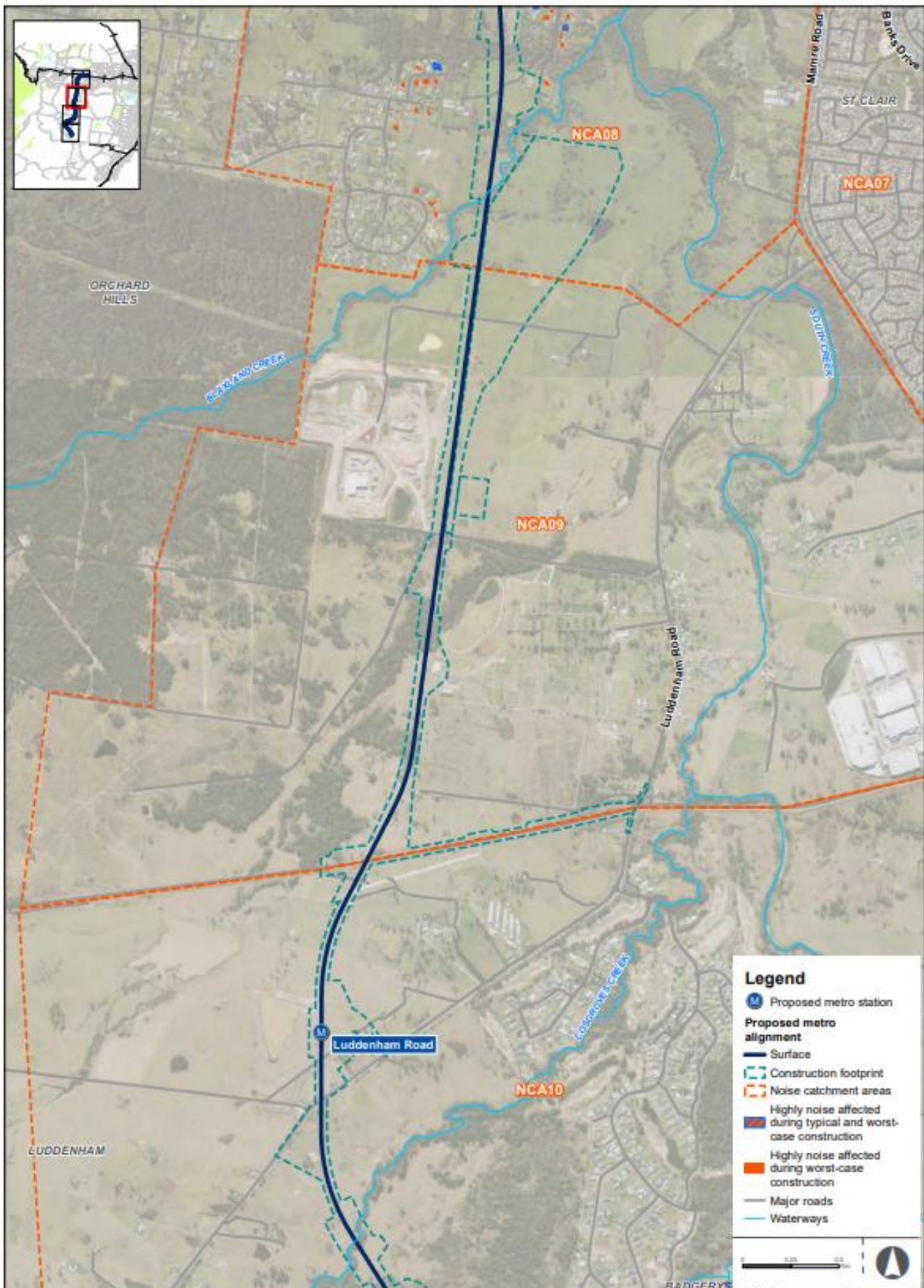


FIGURE 4 RESIDENTIAL RECEIVERS POTENTIALLY EXCEEDING HIGHLY NOISE AFFECTED DURING TYPICAL ACTIVITIES

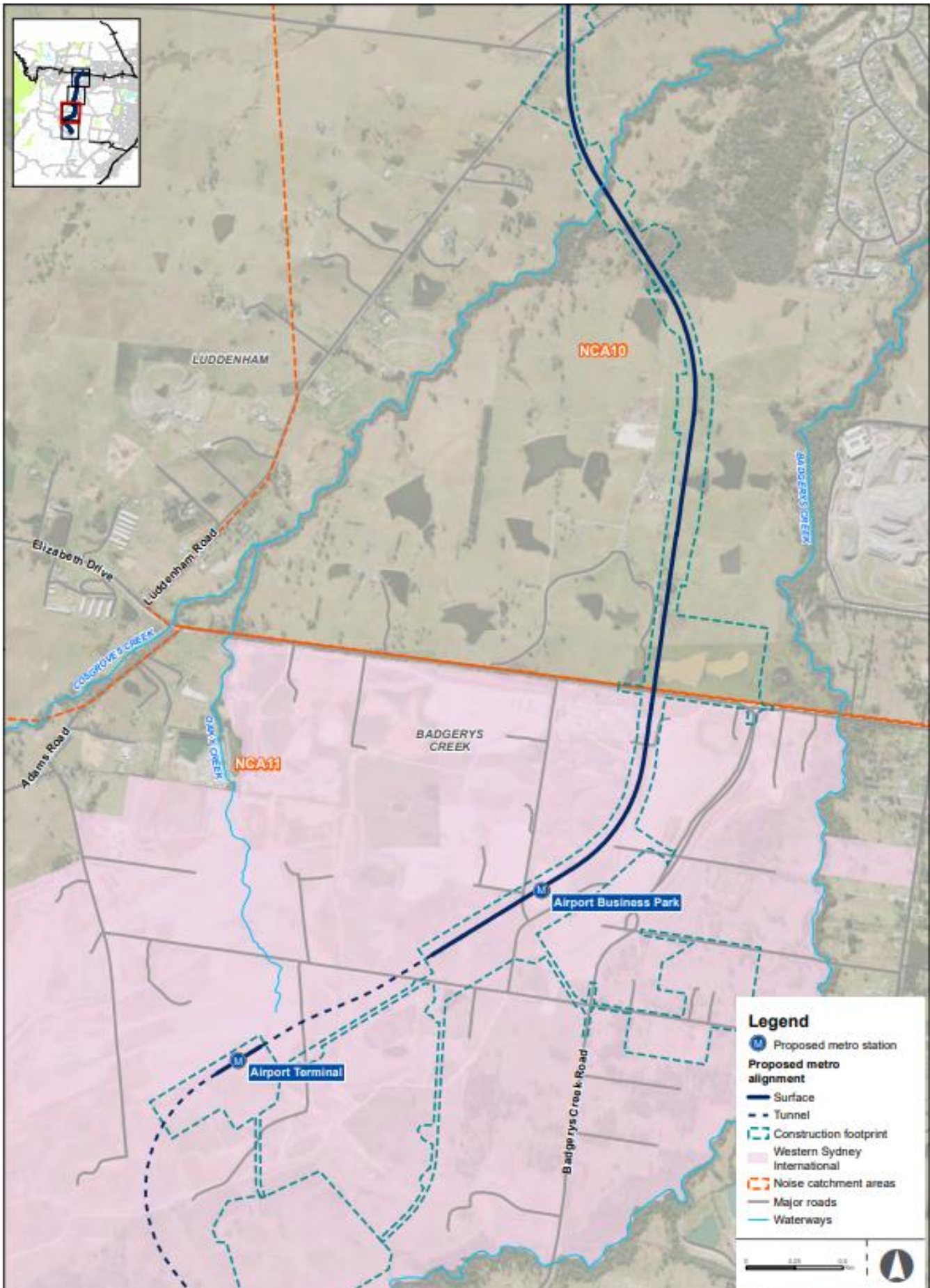


FIGURE 5 RESIDENTIAL RECEIVERS POTENTIALLY EXCEEDING HIGHLY NOISE AFFECTED DURING TYPICAL ACTIVITIES

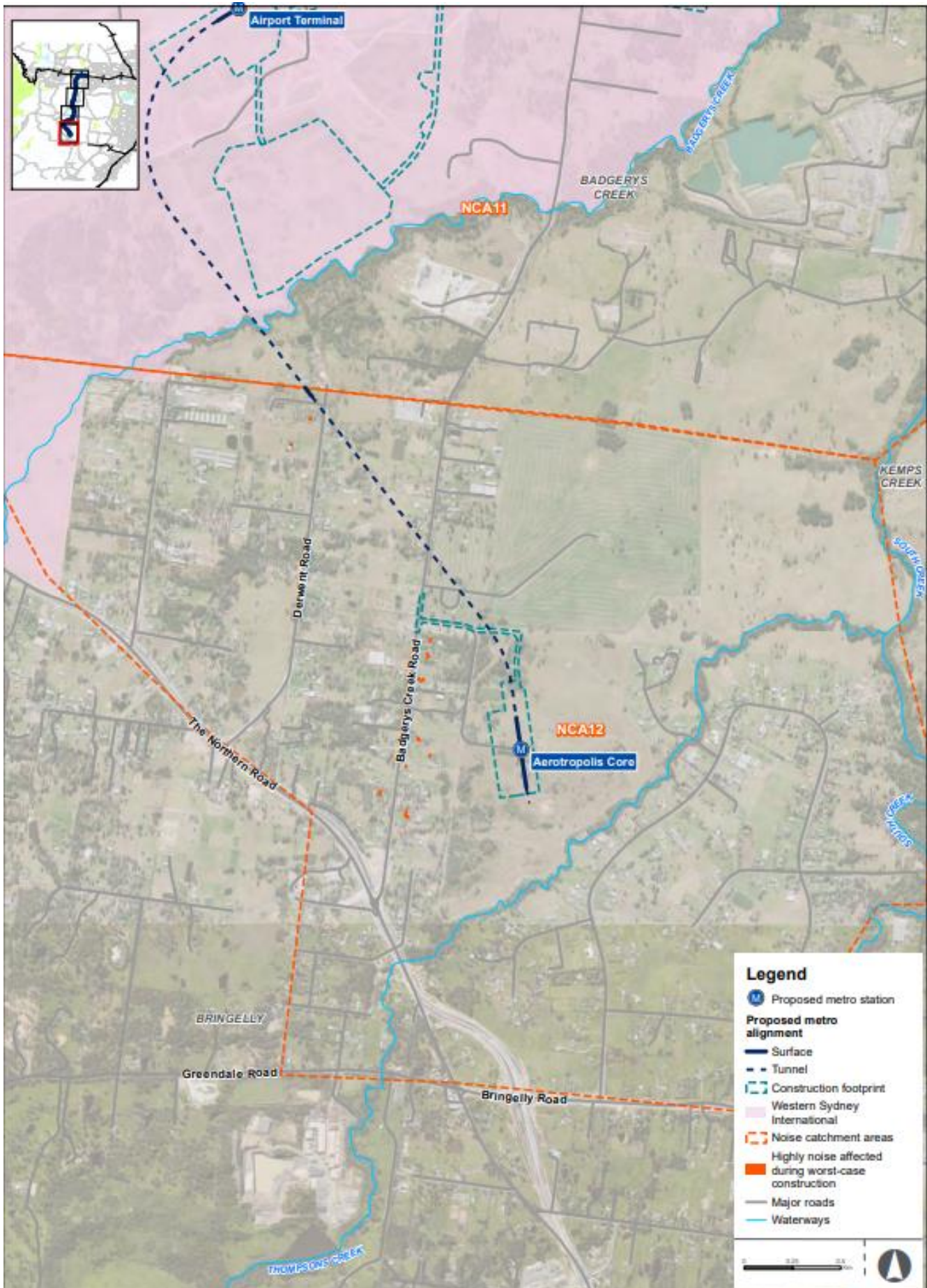


FIGURE 6 RESIDENTIAL RECEIVERS POTENTIALLY EXCEEDING HIGHLY NOISE AFFECTED DURING TYPICAL ACTIVITIES

7.2.2 Construction Traffic

The results of the construction traffic assessment presented in Table 4-31 of the EIS Technical Paper 2, and shown in Figure 7, indicate that construction road traffic noise levels are predicted to comply with relevant RNP noise criteria at the majority of access roads. The exception to this, where RNP noise criteria is predicted to be exceeded, is at Kent Road and Badgerys Creek Road, as shown in Figure 7. SSTOM Works construction traffic will access worksites via the designated heavy vehicle routes and are not likely to result in peak truck movements associated with spoil haulage, and are therefore unlikely to result in exceedances of the RNP trigger levels. Therefore, no additional noise mitigation or management measures would be required at these locations.

Where local roads that have previously not been assessed are used to access compounds, Parklife Metro D&C will complete an assessment once detailed vehicle movements are confirmed. In the event that an increase greater than 2 dB(A) is predicted, existing road traffic noise levels will be further evaluated by Parklife Metro D&C to determine if the receiver is also above the relevant RNP base criteria. If the receiver is above the RNP base criteria and predicted to experience an increase in noise greater than 2 dB(A) from construction traffic, options will be further investigated to identify feasible and reasonable noise mitigation measures to reduce the potential noise impacts and preserve acoustic amenity. This investigation and assessment will be made available to the Planning Secretary upon request, to support any application to DPE for approval to use a local road in accordance with Condition E105.

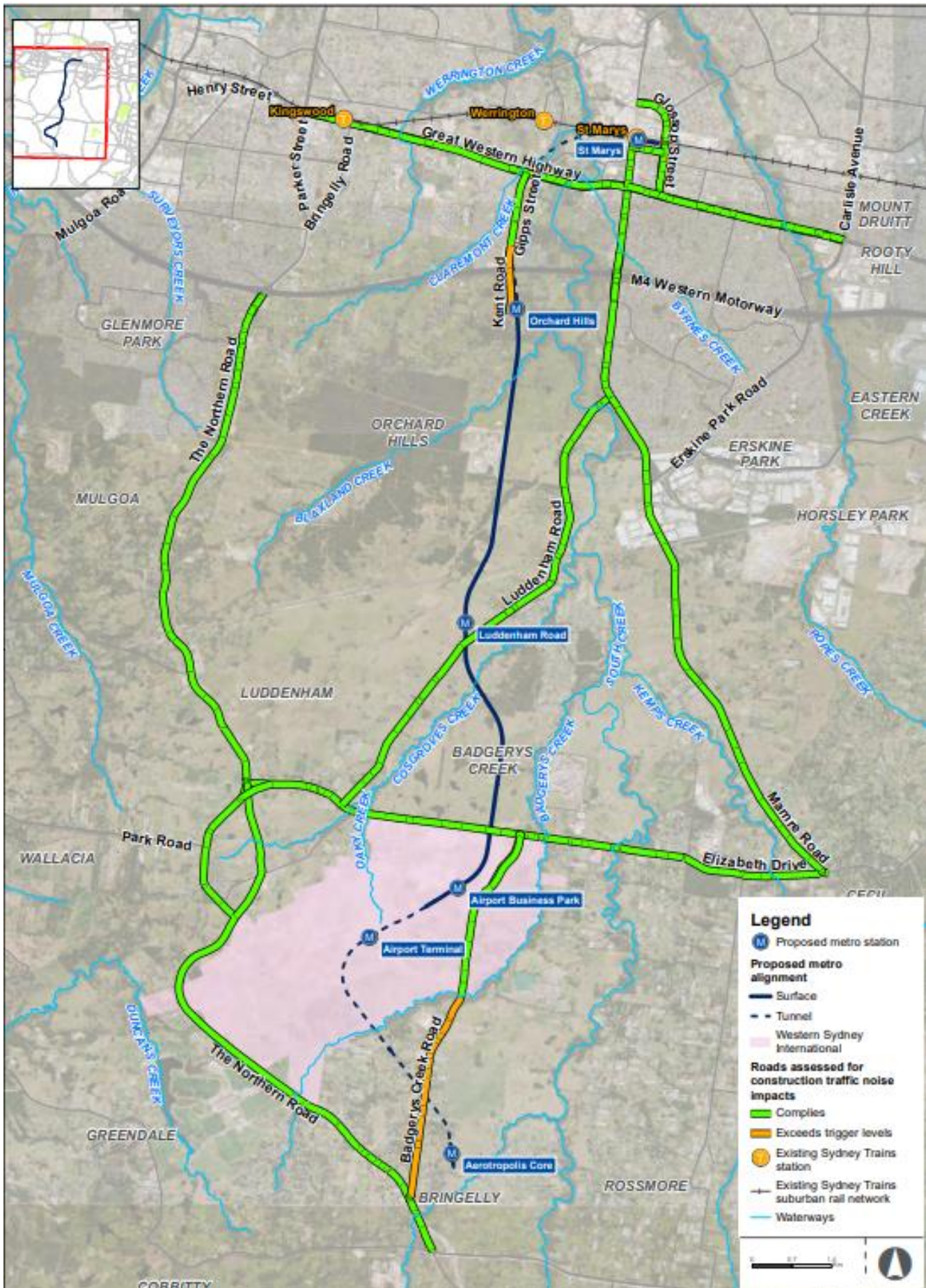


FIGURE 7 CONSTRUCTION TRAFFIC ROUTES AS MODELLED FOR THE EIS

7.2.3 Ground-borne Noise

Ground-borne (or regenerated) construction noise is often of primary concern on tunnelling projects when vibration from activities such as rock-breaking, road heading, rotary cutting, tunnel boring and rock drilling/sawing can be transmitted through the ground and into the habitable areas of nearby buildings. Ground-borne noise occurs when this vibration in the ground and/or building elements is regenerated as audible noise within areas of occupancy inside the building.

SSTOM Works will not involve any tunnelling activities. In addition, due to the distance between construction works and receivers, ground-borne noise impacts are expected to be negligible in comparison to airborne noise impacts. For this reason, ground-borne noise is not anticipated to result in any negative reaction from the surrounding community and therefore further assessment of ground borne noise is not required. The application of mitigation measures (refer to Section 9) for the control of airborne noise emissions and vibration is expected to adequately address ground-borne noise.

7.2.4 Construction Vibration

Vibration impacts to residents and buildings have the potential to occur during construction of the SSTOM Works. The main sources of construction vibration include:

- Vibratory rollers
- Rock breaking
- Hydraulic hammers
- Vibratory and impact pile driving
- Pile boring
- Jackhammers.

The main sources of vibration during construction of the SSTOM Works will be associated with station and maintenance facility construction and the use of piling rigs, vibratory rollers and excavators. It is expected that vibration impacts will be able to be controlled to avoid cosmetic and structural damage to all structures. Where works are within the minimum working distances of structures, a detailed review of the required construction methods will be completed. If required a detailed DNVIS will be completed (see Section 8.2) and any recommendations for vibration monitoring and management will be implemented.

The properties within the greatest recommended minimum working distances for vibration intensive plant (see Table 21) from the project boundary have been identified as potentially at risk of exceeding the screening criteria for cosmetic damage. As per the recommended minimum working distances for large vibratory rollers in Table 21, this means that properties within 35 metres the project boundary will be further assessed as part of the applicable DNVIS. These properties have been identified in accordance with Condition E48.

Where vibration intensive works are required to be undertaken within the specific minimum working distances (identified in Section 6.4.4), vibration monitoring will be undertaken to ensure acceptable levels of vibration are satisfied. In relation to human comfort, the minimum working distances relate to continuous vibration. For most construction activities, vibration emissions would be intermittent in nature.

Where detailed vibration reviews or DNVIS identify that preferred values for vibration are likely to be exceeded, the construction methodology will be reviewed and, if necessary, amended and/or additional mitigation measures will be implemented to meet the preferred values for vibration. Community consultation will be undertaken with any sensitive receiver where vibration impacts have the potential to occur throughout construction of the SSTOM Works.

Considering the distance of the typical nearest residential receivers to the SSTOM worksites, vibration represents a low risk of impact to the surrounding community.

No blasting is proposed as part of the scope of SSTOM works.

7.2.5 Heritage Receivers and Vibration

Heritage listed structures should not be assumed to be more sensitive to vibration unless they are structurally unsound, which is unlikely for a regularly maintained structure. Where a historic structure is deemed to be sensitive to damage from vibration following inspection by qualified structural and/or civil engineers, more conservative superficial cosmetic damage criterion (2.5mm/s PPV) should be considered. The EIS (Technical Paper 2) identified heritage receivers relevant to noise and vibration impacts associated with SSTOM Works which are summarised in in Table 25.

TABLE 25 IDENTIFIED HERITAGE RECEIVERS

Heritage receiver	Construction site	Listing	Significance	Approximate distance to construction footprint
St Marys Railway Station Group	St Marys	SHR 01249 RailCorp s170 SHI 4801036 Penrith LEP	State	Located within the construction footprint
Queen Street, St Marys, Post-War Commercial Building	St Marys	Potential	Local	Immediately adjacent to the Construction footprint
St Marys Munitions Workers Housing	St Marys	Potential	Local	10 metres
Four Winds – Dwelling	Claremont Meadows services facility	Penrith LEP	Local	270 metres
Brick House	Claremont Meadows services facility	Penrith LEP	Local	300 metres
Warragamba to Prospect Water Supply Pipelines	Off-airport corridor	WaterNSW s170 (SHI 4580161X)	State	Located within the construction footprint
McGarvie-Smith Farm	Off-airport corridor	Penrith LEP	Local	0 (to 300m)

Buildings that are potentially at risk of threshold or cosmetic damage would be identified prior to the commencement of construction works. No construction activities have currently been identified that would potentially exceed the vibration criteria outlined in Table 17. However, construction activities would be reviewed as part of ongoing risk assessment as described in Section 8.1 and if cosmetic damage objectives are likely to be exceeded works would not proceed unless:

- A different construction method with lower source vibration levels is used, where feasible, or
- Attended vibration measurements are carried out at the start of the works to determine the risk of exceeding of the vibration objectives.

A specific assessment would be undertaken to avoid potential vibration impacts to the Warragamba to Prospect Water Supply Pipelines, in accordance with REMM NV2. In addition to its heritage significance, the criticality of the Warragamba to Prospect Water Supply Pipelines and its construction will be considered during the specific assessment undertaken in accordance with REMM NV2 when determining vibration impact.

8 Noise and Vibration Management

8.1 Risk Assessment and Management

Aspects and the potential for impacts have been considered by Parklife Metro D&C as a high level-project wide risk assessment which is included as Appendix C of the CEMP. This risk assessment was informed by the EIS, Submissions Report, and the SSI 10051 Planning Approval, and identifies mitigation measures and standard controls for management of noise and vibration.

Environmental risk assessments are completed at each stage of project planning and delivery, and each level of risk assessment is periodically reviewed. The key documents and activities underpinning ongoing environmental risk assessment are:

- Construction planning documentation and risk assessments
- Environmental Work Method Statements (EWMS)
- Pre-start meetings
- DNVIS preparation
- Out of Hours Works Protocol and Out-of-Hours Work Permit process.

The ongoing identification and management of environmental risks and opportunities is a key consideration during all project risk assessment activities and is further described in Section 3.4 of the CEMP.

The outcomes of the risk assessment found that construction activities at construction sites would have a low to medium impact on surrounding residential and other sensitive receivers, however this would be managed through the DNVIS and OOHW Permit process.

8.2 Detailed Noise and Vibration Impact Assessment

In accordance with Condition E47, a DNVIS will 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 will supplement this Sub-Plan and will refine impact predictions provided in the EIS considering actual construction methodology, plant and equipment, location and duration. The DNVIS will include specific mitigation measures to be implemented for the duration of the activity.

In accordance with Condition E49, activities that would exceed highly noise affected criteria during typical case construction must not commence until the controls identified in the DNVIS have been implemented, unless otherwise agreed with the Planning Secretary. Path controls will be considered in conjunction with at-property treatment and nominated in the DNVIS. 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.

In accordance with Condition E51, where a DNVIS is triggered for receivers who will be highly noise affected and the DNVIS determines that at-property treatment (temporary or permanent) is the appropriate measure to reduce noise impacts, the at-property treatment will be offered to the landowners of residential properties for habitable living spaces, unless other mitigation measures are agreed to by the landowner. In accordance with Condition E52, the offer for at-property treatment does not expire until the noise impacts affecting the property are completed, even if the landowner refuses the offer. The implementation of at-property treatment will not preclude the application of other noise and vibration management measures including temporary and long-term accommodation. Community consultation will be undertaken in accordance with the Community Communications Strategy.

The DNVIS will be a key site management tool for high impact works and out-of-hours works to provide clear instructions for managing noise and vibration by providing activity specific noise and vibration predictions and specific, and reasonable and feasible mitigation measures identified through consultation with affected sensitive land user(s) to be implemented for the duration of the works.

The DNVIS will also provide data for the Out-of-Hours Work Permit in accordance with the Out-of-Hours Work Protocol which will demonstrate compliance regarding the assessment of Out-of-Hours Work activities.

Monitored noise and vibration levels will be analysed against the predictions made in the relevant DNVIS. This will allow a like-for-like comparison of actual and predicted noise levels (incorporating relevant mitigation measures) and will allow for ongoing review, verification and, where required, amendment of the predictive model.

The DNVIS will be provided to the ER prior to the works and will be provided to the Planning Secretary and the EPA on request.

8.3 OOHWP Permit

The OOHWP is provided in Appendix D. This addresses the requirements of Condition E42. In accordance with Condition E47, a DNVIS would be prepared where works are required to be undertaken outside of standard construction hours and result in exceedances of the applicable NML or exceed the vibration criteria.

Works subject to an EPL will be approved as per the requirements of that EPL, which may permit out of hours works in accordance with Condition E41(c)(i).

8.4 Noise and Vibration Management Tool

A noise and vibration management tool will be used by the Parklife Metro D&C team to allow defined work areas and activities to be planned, assessed and managed as construction works progress. The noise and vibration management tool will be used in conjunction with any applicable DNVIS prepared in accordance with Condition E47 to identify any potential impacts to sensitive receivers, which will assist in identifying the reasonable and feasible noise and vibration mitigation measures to be applied to the works. The tool will also assist in managing cumulative noise and vibration impacts from other nearby SSTOM Works, as well as other construction projects being undertaken concurrently to the SSTOM Works.

9 Environmental Controls

9.1 Overview

The proposed reasonable and feasible noise and vibration mitigation has been developed in accordance with the Project Planning Approval and the CNVS and are provided in Table 26. These measures detail the industry best practice construction methods to be implemented where reasonably practicable to ensure that noise and vibration levels are minimised around sensitive land uses. These mitigation measures have been developed considering the SMART principles, being specific with measurable outcomes.

Where mitigation measures or controls that are not necessarily sourced from industry guidelines and standards are identified in this NVMP or during the course of construction, but are considered industry best-practice and are the most suitable approach for management of the SSTOM Works, this will be approved by the Parklife Metro D&C Environmental Manager, in consultation with Sydney Metro and the ER, as required.

No blasting will be undertaken nor are there sheds proposed to be designed and constructed as part of the SSTOM Works.

TABLE 26 NOISE AND VIBRATION MANAGEMENT AND MITIGATION MEASURES

ID	Requirement	Source or req.	Responsibility
NV_M1	The SSTOM Works induction will include environmental information, which must be attended by construction personnel prior to commencing work on site. The environmental section of the induction will include: - The requirements of this Sub-plan - Relevant legislation and guidelines - Project specific requirements - Approved construction hours - Out-of-hours works approval, including consultation - Complaints management - Incident notification procedures - The requirements of the Monitoring Program - Appropriate behavioural practices, including no swearing or unnecessary shouting or loud stereos/radios; no dropping of materials from height; throwing of metal items; and slamming of doors, no excessive revving of plant and vehicle engines and controlled release of compressed air.	Best Practice CNVS	Environment Manager
NV_M2	Training will be provided to relevant personnel, including relevant sub-contractors on noise and vibration requirements from this NVMP through inductions, toolboxes or targeted training.	Best Practice	Environment Manager / Coordinator
NV_M3	Noise and vibration verification monitoring will be undertaken in accordance with this Sub-plan, as identified in the DNVISs and any EPL conditions	Condition C15 CNVS EPL	Environment Manager
NV_M4	All construction plant and equipment used on the site will be: - Regularly serviced low sound power equipment - Fitted with properly maintained noise suppression devices - Operated in a proper and efficient manner - Serviced and maintained in accordance with manufacturers specifications. If a piece of plant or equipment is found to exceed the noise or vibration levels identified in Table 14 and/or Table 21 or as included in modelling, the following will occur: - At-source control or a quieter or less vibration emitting piece of plant or equipment will be utilised (if available and appropriate); - On-site mitigation (e.g. noise blankets) will be reviewed; - The noise assessment (where required) will be repeated with the accurate noise level of the plant / equipment.	Condition E46 CNVS	Supervisor Environmental Coordinators
NV_M5	Non-tonal movement alarms will be used in place of tonal reversing alarms for all plant and machinery	Condition E46	Site Supervisor
NV_M6	Plant and machinery will be switched off when it is not in use	Condition E46	Site Supervisor

ID	Requirement	Source or req.	Responsibility
NV_M7	A DNVIS will be prepared for any work that may exceed the NMLs, vibration criteria and / or ground-borne noise levels at any residence outside standard construction hours, 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.	Condition E47	Environmental Manager
NV_M8	Appropriate respite periods for out-of-hours work will be identified in consultation with the community at each affected location on a regular basis. For out-of-hours work, appropriate respite periods would be identified in consultation with the community at each affected location on a regular basis in accordance with Condition E57. Consultation would 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). Note: Parklife Metro D&C commit to considering all community feedback gathered during consultation with potentially impacted sensitive receivers.	Condition E56 Condition E57	Environmental Manager Community Engagement Manager
NV_M9	Construction works will be scheduled in consultation with managers of other nearby projects that are likely to result in cumulative impacts. This will include the coordination of respite between the various construction projects where receivers are likely to experience concurrent construction impacts where feasible. Coordination between project teams will be carried out throughout construction	CEMF 3.8	Environmental Manager Construction Manager Stakeholder and Community Engagement Manager
NV_M10	Work, including those by third-parties, will be coordinated to ensure respite periods are provided, including short-term respite periods for highly noise intensive work in accordance with Condition E39, as far as practicable.	Condition E39 Condition E56	Environmental Manager Construction Manager Community and Stakeholder Manager
NV_M11	Noise and vibration generating work in the vicinity of potentially-affected community, religious, educational institutions, noise and vibration-sensitive businesses and critical working areas resulting in noise levels above the NMLs will not be scheduled within sensitive periods, unless offers of other reasonable arrangements have been made to the affected institutions. Sensitive periods will be identified through consultation with the potentially impacted sensitive receiver.	Condition E45	Environmental Manager Construction Manager Community and Stakeholder Manager
NV_M12	Properties within 35 metres of the project boundary have the potential to be at risk of exceeding the screening criteria for cosmetic damage, which will be identified within the DNVIS and will be notified before vibrating works commence. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owners and occupiers will be provided a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances	Condition E48	Environmental Manager
NV_M13	Vibration monitoring will be carried out before and during vibration generating activities that have the potential to impact on heritage items to identify minimum working distances to prevent cosmetic and structural damage. In the event that the vibration testing and monitoring shows that the preferred values for vibration	Condition E54	Environmental Manager Construction Manager

ID	Requirement	Source or req.	Responsibility
	are likely to be exceeded, the construction methodology will be reviewed and, if necessary, amended and/or implement additional mitigation measures.		
NV_M14	Advice from a heritage specialist will be sought on methods and locations for installing equipment used for vibration, movement and noise monitoring at heritage listed structures if monitoring is required.	Condition E55	Environmental Manager
NV_M15	Prior to the commencement of vibration generating works that could impact on the structure/asset, a suitably qualified person will complete a Pre-Construction Survey to the owners of surface and sub-surface structures and other relevant assets identified at risk from vibration (where the offer is accepted)	Condition E84 Condition E85	Environmental Manager
NV_M16	After completion of the works, post-condition surveys of all structures/assets for which Pre-Construction Condition Surveys were undertaken, will be completed by a suitably qualified person. The Post Construction Condition Survey Reports will be provided to the owner of the structures/ass surveyed within three months following works that could cause impacts.	Condition E86	Environmental Manager
NV_M17	Air brake silencers would be used on heavy vehicles that access construction sites multiple times per night or over multiple nights, noting that site speed restrictions are likely to prevent the triggering of air brakes	CNVS	Plant Manager Site Supervisor
NV_M18	Implement community consultation measures (including notification of upcoming works) using the following tools: • Periodic Notification (letterbox drop) • Website • Project information and construction response • Telephone line • Email distribution list • Place Managers Note: Parklife Metro D&C commit to utilising the preferred community consultation tools as identified by individual sensitive receivers.	CNVS	Community and Stakeholder Engagement Manager Environmental Manager
NV_M19	Out-of-hours deliveries will be minimised where possible and will be carried out in accordance with the OOHW protocol and/or the EPL	CNVS	Environmental Manager Construction Manager
NV_M20	Noise will be considered when selecting construction methods and quieter methods substituted where reasonable and feasible.	CNVS	Construction Manager Site Supervisor
NV_M21	Plant and equipment will be managed to ensure that noise levels have an operating Sound Power Levels (SWL) compliant with the maximum noise levels detailed in Table 13 of the Sydney Metro CNVS, provided in Table 14	CNVS	Construction Manager Site Supervisor
NV_M22	Regular monitoring of plant and equipment will be undertaken to confirm SWL levels	CNVS	Environmental Manager Environmental Coordinator
NV_M23	Traffic flow, parking and loading/unloading areas will be planned to minimise reversing within the Site	CNVS	Traffic Manager Site Supervisor
NV_M24	Site sheds, acoustic enclosures and sheds and other structures will be used within the site to provide noise barriers to receivers where practicable	CNVS	Site Supervisor Environmental Coordinator

ID	Requirement	Source or req.	Responsibility
NV_M25	Additional temporary screening or enclosures will be considered for plant and equipment where additional measures are required to meet relevant NMLs, or where plant and equipment is known to exceed the NMLs	Condition E46	Site Supervisor Environmental Coordinator
NV_M26	Stationary noise sources will be enclosed or shielded where reasonable and feasible.	Condition E46	Site Supervisor Environmental Coordinator
NV_M27	A specific assessment would be undertaken to inform construction methodology and avoid potential vibration impacts to the Warragamba to Prospect Water Supply Pipelines. The assessment would be undertaken in accordance with the <i>Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines</i> (WaterNSW, Sep 2021) and would consider the following requirements: • velocity limits for construction activities and the impact the works will have on WaterNSW assets • excavation methods in accordance with German Standard DIN 4150-3:2016 • vibration monitoring prior to and during construction for high risk construction activities • vibration monitoring reports would be provided to WaterNSW	REMM NV2	Environmental Manager Environmental Coordinator

9.2 Additional Noise and Vibration Management Measures

The implementation of the standard management measures, compliance with maximum sound power levels for plant and equipment, management of construction hours and standard community consultation measures should significantly reduce the noise and vibration impacts on nearby sensitive receivers. In circumstances where, following application of the standard mitigation measures, the LAeq(15minute) construction noise and vibration levels are still predicted to exceed the Noise Management Level or vibration targets, the relevant Additional Mitigation Measures (AMM) in Table 27, Table 28 and Table 29 will be used to determine any offset strategies for these impacts where reasonable and feasible.

The implementation of these measures can be found in the CNVS and Out of Hours Work Protocol.

TABLE 27 ADDITIONAL MITIGATION MEASURES MATRIX - AIRBORNE NOISE

Time Period		Mitigation Measures for predicted LAeq(15 minute) airborne noise level above NML			
		0-10 dB	10-20 dB	20- 30 dB	>30 dB
Approved construction hours	Mon-Fri (7.00 am - 6.00 pm)				
	Sat (8.00 am - 1.00 pm)	-	LB	LB, M, SN	LB, M, SN
	Sun/Pub Hol (Nil)				
OOHW (Evening)	Mon-Fri (6.00 pm - 10.00 pm)				
	Sat (1.00 pm - 10.00 pm)	LB	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO
	Sun/Pub Hol (8.00 am - 6.00 pm)				
OOOHW (Night)	Mon-Fri (10.00 pm - 7.00 am)				
	Sat (10.00 pm - 8.00 am)	LB	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, AA
	Sun/Pub Hol (6.00 pm - 7.00 am)				

NOTE: Phone calls (PC), Monitoring (M), Individual briefings (IB), alternative accommodation (AA), specific notification (SN), letterbox drop (LB), duration reduction (DR), Project specific respite offer (RO)

TABLE 28 ADDITIONAL MITIGATION MEASURES MATRIX - GROUND-BORNE NOISE

Time Period		Mitigation Measures for predicted LAeq(15 minute) ground-borne noise level above NML		
		0-10 dB	10-20 dB	>20 dB
Approved construction hours	Mon-Fri (7.00 am - 6.00 pm)			
	Sat (8.00 am - 1.00 pm)	No NML for Ground-borne noise during standard construction hours		
	Sun/Pub Hol (Nil)			
OOHW (Evening)	Mon-Fri (6.00 pm - 10.00 pm)			
	Sat (1.00 pm - 10.00 pm)	LB	LB, M, SN	LB, M, SN, IB, PC, RO
	Sun/Pub Hol (8.00 am - 6.00 pm)			
OOOHW (Night)	Mon-Fri (10.00 pm - 7.00 am)			
	Sat (10.00 pm - 8.00 am)	LB	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, AA
	Sun/Pub Hol (6.00 pm - 7.00 am)			

NOTE: Phone calls (PC), Monitoring (M), Individual briefings (IB), alternative accommodation (AA), specific notification (SN), letterbox drop (LB), duration reduction (DR), Project specific respite offer (RO)

TABLE 29 ADDITIONAL MITIGATION MEASURES MATRIX - GROUND-BORNE VIBRATION

Time Period		Mitigation Measures for predicted vibration levels exceeding maximum levels
Approved construction hours	Mon-Fri (7.00 am - 6.00 pm)	
	Sat (8.00 am - 1.00 pm)	LB, M, RO
	Sun/Pub Hol (Nil)	
OOHW (Evening)	Mon-Fri (6.00 pm - 10.00 pm)	
	Sat (1.00 pm - 10.00 pm)	LB, M, IB, PC, RO, SN
	Sun/Pub Hol (8.00 am - 6.00 pm)	
OOOHW (Night)	Mon-Fri (10.00 pm - 7.00 am)	
	Sat (10.00 pm - 8.00 am)	LB, M, IB, PC, RO, SN, AA
	Sun/Pub Hol (6.00 pm - 7.00 am)	

NOTE: Phone calls (PC), Monitoring (M), Individual briefings (IB), alternative accommodation (AA), specific notification (SN), letterbox drop (LB), duration reduction (DR), Project specific respite offer (RO)

9.3 Consultation, Notification and Respite

Throughout delivery, Parklife Metro D&C will continue to consult with relevant councils and community stakeholders, including any other noise sensitive receivers such as schools, medical facilities and places of worship.

Notification providing progress on construction and updates of any out of hours works or vibratory works exceeding the screening criteria for cosmetic damage will be provided to the local community in accordance with the Community Communication Strategy prepared in accordance with the Sydney Metro Overarching Community Communication Strategy.

In accordance with Condition 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 will be timetabled so as to avoid sensitive periods, unless other reasonable arrangements have been made with the affected institutions.

For out-of-hours work, appropriate respite periods would be identified in consultation with the community at each affected location on a regular basis in accordance with Condition E57. Consultation would include (but not be limited to) providing the community with:

- a progressive schedule for periods no less than three (3) months, of likely out-of-hours work
- a description of the potential work, location and duration of the out-of-hours work
- the noise characteristics and likely noise levels of the work
- 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, identified respite periods and scheduling of the likely out-of-hour work will be provided to the ER, EPA and the Planning Secretary prior to the out of hours working commencing.

9.4 Cumulative Impact Management

Parklife Metro D&C will manage the potential for cumulative impacts via coordination and engagement with key stakeholders and other SSI projects in accordance with the Sydney Metro Construction Cumulative Impacts Management Plan (developed by Sydney Metro in accordance with REMM CL1). This may include regular meetings with contractors involved with the construction of M12, Western Sydney International, and other packages of the Sydney Metro Western Sydney Airport Project.

In accordance with Condition E56 out-of-hours work undertaken by third parties (such as utility relocations), will be coordinated to the greatest extent possible to ensure respite periods are provided, this includes:

- reschedule any work to provide respite to impacted noise sensitive receivers so that the respite is achieved in accordance with Condition E57 (refer to Section 8.4), or
- consider the provision of alternative respite or mitigation to impacted noise sensitive receivers.

10 Compliance Management

10.1 People, Responsibilities and Communication

The environmental roles and responsibilities of key project personnel are outlined in Section 3.5 of the CEMP.

A specialist noise and vibration consultant will be engaged by Parklife Metro D&C to support the implementation of this Sub-plan and the Noise and Vibration Construction Monitoring Program.

10.2 Training

All employees, subcontractors and staff working on Site will undergo site induction training that includes construction noise and vibration management issues. The induction training will address elements related to project-specific noise and vibration management including:

- Requirements of this NVMP
- Standard, extended and out of hours construction
- The process for seeking approval for out of hours works, including consultation
- Location of noise sensitive areas and receivers
- General noise and vibration management measures
- Complaints reporting
- Specific responsibilities to minimise impacts on the community and built environment
- Targeted training for staff conducting noise and vibration measurements.

Further details regarding staff induction and training are outlined in Section 3.6 of the CEMP.

10.3 Hold Points

The internal hold points applied to Noise and Vibration Management for the CTP are identified in Table 30.

TABLE 30 NOISE AND VIBRATION HOLD POINTS

Hold Point	Release of Hold Point	Source	Where addressed	Released by
Land use survey	Land use survey to be completed before the commencement of work in each location which generates construction noise, vibration or ground-borne noise in that area.	Condition E37	Section 4.2 Appendix C	Environment Manager (or delegate)
Out of Hours Work	Prior to out of hours work an Approved OOHW Application Form is required in accordance with the Out of Hours Works Protocol, including an appropriate Noise Assessment	Condition E41(c), Condition E42 CEMF 3.10	Appendix D	Environment Manager (or delegate)
Pre-construction Condition Survey	Pre-construction condition survey report to be prepared prior to undertaking vibratory works resulting in vibration levels above those determined appropriate by a suitably qualified structural engineer	Condition E84 CEMF 3.10	Section 6.4 Section 7.2.4	Construction Manager / specialist structural engineer
Noise and Vibration Construction Monitoring Program	Noise and Vibration Construction Monitoring Program approved prior to construction	Condition C13	Appendix B	Endorsed by ER Approved by Planning Secretary
DNVIS	Prior to undertaking any work that may exceed the NML, vibration criteria and/or ground borne noise criteria at any residence outside standard	Condition E47	Section 8.2	Endorsed by ER Approved by Planning Secretary

Hold Point	Release of Hold Point	Source	Where addressed	Released by
	construction hours, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate	CEMF 3.10		

10.4 Monitoring and Inspections

Weekly site environmental inspections will be undertaken by our environmental team using a Parklife Metro D&C SSTOM Works-specific checklist to assess the ongoing effectiveness and suitability of the environmental controls. Refer to Section 3.9 of the CEMP for the indicative list of environmental inspections that may be undertaken during the delivery of the SSTOM Works.

Noise and vibration monitoring will also occur routinely for the duration of the delivery of the SSTOM Works, in accordance with the Noise and Vibration Construction Monitoring Program (Appendix B). The noise and vibration monitoring program details when monitoring will be undertaken, as well as the representative locations adjacent to the construction works where noise and vibration monitoring will be undertaken.

10.5 Complaints

Complaints related to noise and vibration impacts will be handled in accordance with the Construction Complaints Management System and the Parklife Metro D&C's Community Communication Strategy. Complaints will be dealt with in a responsive manner, with a verbal response provided to the complainant as soon as possible and within a maximum of two hours from the time of the complaint (unless the complainant requests otherwise). A detailed written response will then be provided, if required, to the complainant within one week. For further details on complaints management refer to Section 3.7 of the CEMP.

10.6 Audits

The implementation of this Sub-plan will be the subject of both internal and external audits in order to confirm compliance against relevant approvals, monitor performance and identify opportunities for improvement. Refer to Section 3.9 CEMP for an indicative audit schedule for the SSTOM Works.

10.7 Non-compliance and exceedances

In the event of an incident or non-compliance the reporting requirements detailed in Section 3.8 and 3.9 of the CEMP will be followed. If related to a noise and/or vibration exceedance, Parklife Metro D&C will investigate the exceedance and determine whether the exceedance was attributable to SSTOM Works. If determined to be attributable to SSTOM Works, the exceedance will be classified in accordance with Section 3.8 of the CEMP and the Sydney Metro Environmental Incident Classification and Reporting Procedure.

In accordance with Condition A44, the Planning Secretary will be notified in writing via the Major Projects website within seven days after becoming aware of any non-compliance with the Infrastructure Approval. The notification will identify the project and application number, set out the conditions of approval in which a non-compliance has been identified, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance, in accordance with Condition A45.

It is noted that in accordance with the POEO Act, a pollution incident does not include an incident or set of circumstance involving only the emission of any noise. As a result, noise exceedances cannot be classified as a Material Harm incident and do not require incident notification and reporting in accordance with Condition A41 and A42.

10.8 Reporting and Records

Reporting requirements relevant to this Plan are detailed in Section 3.9 and 3.10 of the CEMP and in the Noise and Vibration Construction Monitoring Program (Appendix B). In accordance with Condition A32 and A33, any reports, records and other documentation prepared or required throughout construction will be made available to the ER and Sydney Metro. In addition, the following records will be retained onsite for the duration of works:

- Records of consultation with other CSSI, SSI and/or SSD Projects with regard to cumulative impacts
- Unattended noise and vibration monitoring reports and records against appropriate NMLs and vibration criteria from consultants and Parklife Metro D&C personnel

- Attended noise and vibration monitoring reports and records against appropriate NMLs and vibration criteria from consultants and Parklife Metro D&C personnel
- Register of OOH Works and Permits
- Records of environmental inspections undertaken
- Records of consultation with sensitive receivers on mitigation measures, enquiries and complaints and investigations
- Records of any community agreements.

11 Review and Improvement

11.1 Continuous Improvement

Parklife Metro D&C will continually improve environmental systems and performance through the implementation of an audit and review program. Refer to Section 3.9 of the CEMP.

11.2 Sub-Plan Update and Amendment

A formal review of the management systems by the Parklife Metro D&C Senior Management Team will also occur on an annual basis, as a minimum. This review shall generate actions for the continual improvement of the systems and supporting management plans.

If changes to this NVMP are identified as required as a result of an annual performance review, or as a result of project changes, construction updates, risk reviews, or general observations throughout construction, they may be approved by the ER in accordance with Condition A32(j), or by the Planning Secretary. Minor changes to this NVMP that may be approved by the ER would generally comprise changes that are of an administrative or minor nature, which do not increase impacts to nearby sensitive land use(s), and are consistent with the terms of the Infrastructure Approval and with the document as approved by the Planning Secretary. Where the ER deems it necessary (ie. where the change is not considered to be minor), the amended NVMP will be provided to the Planning Secretary for approval.

Appendices

Appendix A Other Conditions of Approval, REMMS and CEMF Requirements Relevant to this Plan

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Ref	Requirement	Where addressed
A6	Where the terms of this approval require a document or monitoring program to be prepared, or a review to be undertaken, in consultation with identified parties, evidence of the consultation undertaken must be submitted to the Planning Secretary with the document. The evidence must include: (a) documentation of the engagement with the party identified in the condition of approval that has occurred before submitting the document for approval; (b) a log of the dates of engagement or attempted engagement with the identified party and a summary of the issues raised by them; (c) documentation of the follow-up with the identified party(s) where feedback has not been provided to confirm that the party(s) has none or has failed to provide feedback after repeated requests; (d) outline of the issues raised by the identified party(s) and how they have been addressed; and (e) a description of the outstanding issues raised by the identified party(s) and the reasons why they have not been addressed.	Section 3.5 and Appendix F
E37	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 generate 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 4.2 Appendix C
E38	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	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 5
E40	This approval does not permit blasting.	Section 7.1
E41	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	Section 5 Section 8.3 Appendix D

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Ref	Requirement	Where addressed
	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). (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). (d) By Prescribed Activity, including: (i) tunnelling and ancillary support activities (excluding cut and cover tunnelling and surface works not directly supporting tunneling) are permitted 24 hours a day, seven days a week; or (ii) grout batching at the Orchard Hills ancillary facility is permitted 24 hours a day, seven days a week; or (iii) delivery of material that is required to be delivered outside of standard construction hours in Condition E38 to directly support tunnelling activities, except between the hours 10:00 pm and 7:00 am to / from the Orchard Hills ancillary facility; or (iv) haulage of spoil except between the hours of 10:00 pm and 7:00 am to / from Orchard Hills ancillary facility; or (v) work within an acoustic enclosure are permitted 24 hours a day, seven days a week where there is no exceedance of noise levels or intermittent vibration levels under Low impact circumstances identified in Condition E41(b), unless otherwise agreed with the Planning Secretary; or (vi) tunnel and underground station box fit out works are permitted 24 hours per day, seven days per week. On becoming aware of the need for emergency work in accordance with (a)(ii) above, the ER, the Planning Secretary and the EPA must be notified of the reasons for such work. The Proponent must use best endeavours to notify as soon as practicable all noise and/or vibration affected sensitive land user(s) of the likely impact and duration of those work. Notes: 1. Tunnelling does not include station box excavation. 2. Tunnelling ancillary support activities includes logistics support and material handling and delivery	
E42	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 can be approved by the ER; and (iii) high risk activities that are approved by the Planning Secretary;	Section 5 Section 8.3 Appendix D

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Ref	Requirement	Where addressed
	(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	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: 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
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 6 Section 8 Section 9
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 9.3

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Ref	Requirement	Where addressed
E46	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.	Table 26
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.	Section 8.2
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 are to be provided a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances, unless otherwise agreed by the owner and occupier. These properties must be identified and considered in the Noise and Vibration CEMP Sub-plan.	Section 7.2.4 Section 9.3
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.	Sections 7.2.1, 8.2 and 9
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.	Section 8.2
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.	Section 8.2 and 9.3
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 9.2 and 9.3
E54	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,	Section 9 and Appendix B

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Ref	Requirement	Where addressed
	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.	Section 7.2.5 and Table 26
E56	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 9.3
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. 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 9.3
E84	A suitably qualified and experienced person must undertake condition surveys of all buildings, structures, utilities and the like identified in the documents listed in Condition A1 and the further assessment carried out under mitigation measure GW1 of the Submissions Report as being at risk of damage before commencement of any work that could impact on the subject surface / subsurface structure. The results of the surveys must be documented in a Pre-construction Condition Survey Report for each item surveyed. Copies of Pre-construction Condition Survey Reports must be provided to the relevant owners of the items surveyed in the vicinity of the proposed work, and no later than one (1) month before the commencement of the work that could impact on the subject surface / subsurface structure.	Table 26
E85	Condition surveys of all items for which condition surveys were undertaken in accordance with Condition E84 must be undertaken by a suitably qualified and experienced person after completion of the work identified in Condition E84. The results of the surveys must be	Table 23

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Ref	Requirement	Where addressed
	documented in a Post-construction Condition Survey Report for each item surveyed. Copies of Post-construction Condition Survey Reports must be provided to the landowners of the items surveyed, and no later than three (3) months following the completion of the work that could impact on the subject surface / subsurface structure.	
E87	Appropriate equipment to monitor areas in proximity of ancillary facilities and the tunnel route must be installed during construction has stabilised with particular reference to at risk buildings, structures and utilities identified in the condition surveys required by Condition E84 and / or geotechnical analysis as required. If monitoring during construction indicate exceedance of the vibration criteria identified in the DNVIS prepared under Condition E47, or levels otherwise determined as appropriate by a suitably qualified structural engineer, then all construction affecting settlement must cease immediately and must not resume until fully rectified or a revised method of construction is established that will ensure protection of affected buildings.	Section 8.2
E121	The proponent must consult with WaterNSW regarding design, construction and operational management where the proposal interacts with the Warragamba to Prospect Water Supply Pipeline, and ensure that proposed construction and operational agreements are consistent with the "Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines" and implement all practical measures to protect the Warragamba to Prospect Water Supply Pipelines infrastructure, or as otherwise agreed to by WaterNSW.	Section 6.4.3 Section 7.2.5

Revised Environmental Management Measures

Ref	Requirement	Where addressed
NV1	Where acoustic sheds are installed, the internal lining and type of material used in the construction of the sheds would be considered during design development and construction planning to ensure appropriate attenuation is provided	Section 9.1
NV2	To avoid potential vibration impacts to the Warragamba to Prospect Water Supply Pipelines, a detailed construction vibration assessment would be undertaken in accordance with the Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines (WaterNSW, 2020) and would consider the following requirements: • confirm velocity limits for construction activities and the impact the works will have on WaterNSW assets • excavation methods would be undertaken in accordance with German Standard DIN 4150-3:2016 (2.5 mm/s PPV) • vibration monitoring would be undertaken prior to and during construction for high risk construction activities • vibration monitoring reports would be provided to WaterNSW	Section 7.2.5 and 9.1 (NV_M27) It is acknowledged that the guidelines have been updated and the revised guidelines will be applied during construction (WaterNSW, Sep 2021)
HR4	Where the project crosses or is adjacent to the Warragamba to Prospect Water Supply Pipelines, construction planning, and approaches to minimising risks of damage or rupture to of the Pipelines, would be developed in consultation with WaterNSW, and in accordance with the Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines (Water NSW, 2020)	Section 7.2.5 It is acknowledged that the guidelines have been updated and the revised guidelines will be applied during construction (WaterNSW, Sep 2021)
NAH6	The following heritage items would be monitored for potential vibration impacts during construction: • St Marys Railway Station Group	Condition has not allocated to SSTOM through the Staging Report however vibration impacts

Revised Environmental Management Measures

Ref	Requirement	Where addressed
	- Queen Street Post-War Commercial Building - St Marys Munitions Workers Housing - McGarvie Smith Farm - McMaster Farm	will be considered for these items as part of the DNVIS. Section 6.4.3 Section 7.2.5
NAH8	A dilapidation survey of the Warragamba to Prospect Water Supply Pipelines would be undertaken prior to construction commencing in the vicinity of this item	Section 6.4.3 Section 9.1 (NV_27)

Construction Environmental Management Framework

Ref	Requirement	Where addressed																		
3.8	b. Co-ordination and consultation requirements with these stakeholders would be detailed in the plan to include: i. provision of regular updates to the detailed construction program, construction sites and haul routes ii. identification of key interfaces with other construction projects iii. Development of mitigation strategies to manage cumulative impacts associated with these interfaces.	Section 9.1 Section 9.4																		
3.10b	Table 1.4 provides the structure for the register of hold points as well as a preliminary list of hold points which will be implemented. Table 1.4 Preliminary Register of Hold Points <table border="1"> <thead> <tr> <th>Hold Point</th><th>Release of Hold Point</th><th>By Who</th></tr> </thead> <tbody> <tr> <td>Prior to Vegetation Clearing / Ground Disturbance</td><td>Pre-clearing inspection Erosion and sediment control plan</td><td>Qualified Ecologist Contractor's Environmental Manager or delegate</td></tr> <tr> <td>Discharge of water</td><td>Water tested to verify compliance and approval to discharge</td><td>Contractor's Environment Manager or delegate</td></tr> <tr> <td>Out of hours works</td><td>Noise Assessment</td><td>Contractor's Environment Manager</td></tr> <tr> <td>Use of local roads by heavy vehicles</td><td>Road Dilapidation Report</td><td>Appropriate Professional nominated by Principal Contractor</td></tr> <tr> <td>Construction identified as affecting buildings</td><td>Building Condition Survey</td><td>Appropriate Professional nominated by Principal Contractor</td></tr> </tbody> </table>	Hold Point	Release of Hold Point	By Who	Prior to Vegetation Clearing / Ground Disturbance	Pre-clearing inspection Erosion and sediment control plan	Qualified Ecologist Contractor's Environmental Manager or delegate	Discharge of water	Water tested to verify compliance and approval to discharge	Contractor's Environment Manager or delegate	Out of hours works	Noise Assessment	Contractor's Environment Manager	Use of local roads by heavy vehicles	Road Dilapidation Report	Appropriate Professional nominated by Principal Contractor	Construction identified as affecting buildings	Building Condition Survey	Appropriate Professional nominated by Principal Contractor	Section 10.3
Hold Point	Release of Hold Point	By Who																		
Prior to Vegetation Clearing / Ground Disturbance	Pre-clearing inspection Erosion and sediment control plan	Qualified Ecologist Contractor's Environmental Manager or delegate																		
Discharge of water	Water tested to verify compliance and approval to discharge	Contractor's Environment Manager or delegate																		
Out of hours works	Noise Assessment	Contractor's Environment Manager																		
Use of local roads by heavy vehicles	Road Dilapidation Report	Appropriate Professional nominated by Principal Contractor																		
Construction identified as affecting buildings	Building Condition Survey	Appropriate Professional nominated by Principal Contractor																		
5.1a	Standard working hours are between 7am – 6pm on weekdays and 8am – 1pm on Saturdays.	Section 5																		
5.1b	Works which can be undertaken outside of standard construction hours without any further approval include: i. Those which have been described and assessed in the environmental assessments. For example, tunnelling and underground excavations and supporting activities or works within Western Sydney International	Section 5																		

Construction Environmental Management Framework

Ref	Requirement	Where addressed
	ii. Works which are determined to comply with the relevant Noise Management Level at sensitive receivers; iii. The delivery of materials outside of approved hours as required by the Police or other authorities (including Transport for NSW) for safety reasons; iv. Where it is required to avoid the loss of lives, property and / or to prevent environmental harm in an emergency; and v. Where written agreement is reached with all affected receivers	
5.1c	Where off-airport works are being undertaken under an Environmental Protection Licence, Principal Contractors may apply for EPA approval to undertake works outside of normal working hours.	Section 5
5.3a	Principal Contractors will consider the following in the layout of construction sites: i. The location of noise intensive works and 24 hour activities in relation to noise sensitive receivers; ii. The location of site access and egress points in relation to noise and light sensitive receivers, especially for sites proposed to be utilised 24 hours per day; iii. The use of site buildings to shield noisy activities from receivers; iv. The use of noise barriers and / or acoustic sheds where feasible and reasonable for sites proposed to be regularly used outside of daytime hours; and v. Aim to minimise the requirement for reversing, especially of heavy vehicles	Section 9.1
8.1a	The following noise and vibration management objectives will apply to construction:	Section 2
	i. Minimise unreasonable noise and vibration impacts on residents and businesses;	
	ii. Avoid structural damage to buildings or heritage items as a result of construction vibration;	Section 7.2 Section 8
	iii. Undertake active community consultation;	Section 9.3
	iv. Maintain positive, cooperative relationships with schools, childcare centres, local residents and building owners; and	Section 9.3
	v. For on-airport works, the Sydney Metro Western Sydney Airport Noise and Vibration CEMP will detail all the noise and vibration management objectives and will be consistent with the WSA Noise and Vibration CEMP, including all appendices to the CEMP	N/A
8.2a	On-airport management of noise and vibration will be achieved through the implementation of the SMWSA Noise and Vibration CEMP and Principal Contractors will develop and implement a Construction Noise and Vibration Management Plan for all off-airport works consistent with the Interim Construction Noise Guidelines (Department of Environment and Climate Change, 2009). Both plans will include as a minimum:	Table 26
	i. Identification of work areas, site compounds and access points;	
	ii. Identification of sensitive receivers and relevant construction noise and vibration goals;	Sections 4.2 Section 6
	iii. Be consistent with, and include the requirements of the noise and vibration mitigation measures as detailed in the planning approval documentation and the Sydney Metro Construction Noise and Vibration Standard (CNVS), including the provision of respite;	Section 9

Construction Environmental Management Framework

Ref	Requirement	Where addressed
	iv. Details of construction activities and an indicative schedule for construction works, including the identification of key noise and/or vibration generating construction activities (based on representative construction scenarios) that have the potential to generate noise or vibration impacts on surrounding sensitive receivers, in particular residential areas;	Section 7.1
	v. Identification of feasible and reasonable procedures and mitigation measures to ensure relevant vibrations and blasting criteria are achieved, including a suitable blast program;9	Sections 9 Section 7.2.4
	vi. The requirements of any applicable licence or approval (for example EPL);	EPL
	vii. Additional requirements in relation to activities undertaken 24 hours of the day, 7 days per week;	Section 5
	viii. Pre-construction compliance requirements and hold points;	Section 10.3
	ix. The responsibilities of key project personnel with respect to the implementation of the plan;	Section 10.1
	x. Noise monitoring requirements;	Section 8 and 10.7
	xi. Compliance record generation and management; and	Section 10.7, 10.7 and 10.8 Appendix B
	xii. An Out of Hours Works Protocol applicable to all construction methods and sites.	Appendix D
8.2b	Detailed Construction Noise and Vibration Impact Statements will be prepared for noise-intensive construction sites and or activities to ensure the adequacy of the noise and vibration mitigation measures. Specifically, Construction Noise and Vibration Impact Statements will be prepared for works proposed to be undertaken outside of standard construction hours and to support applications to undertake out of hours works (this includes variations of EPLs and applications to relevant agencies).	Section 8.2
8.2c	Noise and vibration monitoring would be undertaken for construction as specified in the CNVS.	Section 10.4
8.2d	The following compliance records would be kept by Principal Contractors: i. Records of noise and vibration monitoring results against appropriate NMLs and vibration criteria; and ii. Records of community enquiries and complaints, and the Contractor's response.	Section 10.7
8.3a	All feasible and reasonable mitigation measures would be implemented in accordance with the CNVS. The on-airport Noise and Vibration CEMP and the off-airport Noise and Vibration Management Plan will include the following noise and vibration mitigation measures as well as relevant Conditions: i. Construction hours will be in accordance with the working hours specified in Section 5.1;	Section 5
	ii. Hoarding and enclosures will be implemented where required to minimise airborne noise impacts; and	Section 9
	iii. The layout of construction sites will aim to minimise airborne noise impacts to surrounding receivers	Section 9
	iv. Provision of respite periods	Section 9.3

Appendix B Noise and Vibration Monitoring Program

Hugh Chapman
Director Sustainability Environment & Planning
Sydney Metro - Western Sydney Airport
Transport for NSW
PO Box K659
HAYMARKET NSW 1240

28 June 2023

REF: 201209(d)_NVCMP_REV_0.0

Dear Hugh

RE: ER Endorsement of Noise and Vibration Construction Monitoring Program Rev 0.0

Thank you for providing the Sydney Metro Western Sydney Airport (SMWSA) Noise and Vibration Construction Monitoring Program (NVCMP) for the Stations, Systems, Trains, Operations and Maintenance (SSTOM) project.

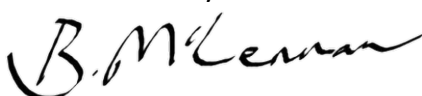
The NVCMP Revision 0.0 dated June 2023 (the NVCMP) was submitted for Environmental Representative (ER) review and endorsement, as required by Condition A32(d) of the Sydney Metro Western Sydney Airport project (SSI 10051 23 July 2021 as modified 14 April 2022).

It is noted that:

- Previous versions of the document were reviewed and updated following comments from Sydney Metro and the ER
- Evidence of consultation records from parties identified in Condition C13 has been provided to the ER in the Noise and Vibration Management Plan and is consistent with Conditions A6.
- The SWQMP addresses the requirements of Conditions C14 and C15.

As an approved ER for the Sydney Metro Western Sydney Airport project, I have reviewed the NVCMP as per Condition A32(d) for consistency with the requirements in or under the Infrastructure Approval, including undertakings made in the documents listed in Condition A1, and endorse the NVCMP for submission to the Planning Secretary for consideration for Approval.

Yours sincerely



Brett McLennan
Environmental Representative – Sydney Metro Western Sydney Airport

Noise and Vibration Monitoring Program

SMWSASSM-PLD-1NL-PC-PLN-000025 (Rev 01)

Parklife Metro D&C

Document Approval

Revision	Author	Date	Comments	Reviewed by	Approved by
A	C. Macpherson	20/02/2023	Initial Draft	Mark Chilton	Richard Graham
B	C. Kennedy	27/03/2023	Issue for stakeholder consultation	Mark Chilton	Richard Graham
C	C. Kennedy	05/05/2023	Revised in response to review comments	Mark Chilton	Richard Graham
00	C. Kennedy	05/06/2023	Revised in response to ER comments	Mark Chilton	Richard Graham
01	C. Kennedy	19/07/2023	Revised in response to DPE comments	Mark Chilton	Richard Graham

Signature	
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Acronym and Definitions

Abbreviation	Expanded Text
AS	Australian Standard
AMMM	Additional Mitigation Measures Matrix
AVTG	NSW EPA guideline Assessing Vibration: A Technical Guideline
CEMF	Construction Environmental Management Framework
NVMP	Noise and Vibration Management Plan
CNVS	Sydney Metro Construction Noise and Vibration Standard
Condition	Planning Minister's Condition of Approval
Construction	Includes all work required to construct the CSSI as described in the documents listed in Conditions A1, including commissioning trials of equipment and temporary use of any part of the CSSI, but excluding Low Impact Work.
dB(A)	A-weighted decibels is an expression of the relative loudness of sounds in the air as perceived by the human ear.
DECC	NSW Department of Environment and Climate Change – NSW Interim Construction Noise Guideline, July 2009.
DNVIS	Detailed Noise and Vibration Impact Statement
DPE	NSW Department of Planning and Environment
EIS	Environmental Impact Statement
EM	Environment Manager
EMS	Environmental Management System
EPA	NSW Environmental Protection Authority
EPL	Environmental Protection License
ER	Environmental Representative nominated by the Proponent and approved by the Planning Secretary in accordance with Condition A27
ICNG	NSW Department of Environment and Climate Change – NSW Interim Construction Noise Guideline, July 2009.
INP	NSW Environment Protection Authority – NSW Environmental Noise Management – Industrial Noise Policy, January 2000 and relevant application notes.
LA₉₀	Background Noise Level. 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).
LA_{eq}	Equivalent Continuous Sound Level
LGA	Local Government Area
LP or SPL	Sound Pressure Level
LW or SWL	Sound Power Level
Minister, the	NSW Minister for Planning and Public Spaces (or delegate)
Monitoring Program	Noise and Vibration Monitoring Program (This document)
NCA	Noise Catchment Area
NML	Noise Management Level
NPI	NSW Environment Protection Authority, <i>Noise Policy for Industry</i> . 2017

Abbreviation	Expanded Text
Non-compliance	An occurrence, set of circumstances, or development that results in a non-compliance or is non-compliant with Infrastructure Approval or other licence, permit or legal requirements, but is not an incident
Non-conformance	Observations or actions that are not in strict accordance with the CEMP and the aspect specific Sub-Plan
OOHW	Out of Hours Works
POEO Act	<i>Protection of the Environment Operations Act 1997.</i>
PPV	Peak Particle Velocity (in mm/s)
RBL	Rating Background Noise Level
REMM	SSD 7308 Revised Environmental Management Measures
RNP	NSW Department of Environment, Climate Change and Water – NSW Road Noise Policy, March 2011.
ROL	Road Occupancy Licence
SSTOM	Stations, Systems, Trains, Operations and Maintenance
the Principal	Sydney Metro
the Project	Sydney Metro Western Sydney Airport
VDV	Vibration Dose Value (in m/s ^{1.75})
Parklife Metro	Consortium comprising entities of Plenary, Siemens, RATP Dev and Webuild as the Applicant for the Sydney Metro Western Sydney Airport SSTOM Package.
Parklife Metro D&C	Parklife Metro Design and Construct. Consists of Webuild S.P.A, Siemens Mobility Pty Ltd and Richard Crookes Constructions Pty Ltd. Responsible for the construction of SSTOM Works

1 Noise and Vibration Monitoring Program

1.1 Context

This Noise and Vibration Monitoring Program (Monitoring Program) is an Appendix of the Noise and Vibration Management Sub-plan (NVMP) and forms part of the Construction Environmental Management Plan (CEMP) for the SSTOM Works. This Monitoring Program has been developed in consultation with relevant Councils and WaterNSW, in accordance with Condition A6. The Monitoring Program is required under Condition C13 and in accordance with the SM-WSA Staging Report, this Monitoring Program will be endorsed by the SSTOM Environmental Representative (ER) before commencement of construction in accordance with Condition C18.

1.2 Scope

The Monitoring Program has been prepared in accordance with the requirements of Planning Approval Conditions (refer to Table 1). The Monitoring program has been developed considering the SMART principles.

This Monitoring Program is the key measurement tool and has been prepared to compare actual performance of the SSTOM Works against the predicted performance the EIS. In addition, the Sydney Metro Construction Noise and Vibration Standard (CNVS) requires the implementation of a monitoring program including:

- Ongoing noise monitoring during construction at affected receivers during critical periods (i.e. times when noise emissions are expected to be at their highest) to identify and assist in managing high risk noise events
- Monitoring will be undertaken inform the relevant personnel when the noise or vibration goal has been exceeded so that additional management measures may be implemented
- Regular compliance checks on the noise emissions of all plant and machinery used for the project to:
 - Indicate whether noise emissions from plant items were higher than predicted,
 - Identify defective silencing equipment on the items of plant, and
 - Assist in determining where additional management measures should be implemented.

1.3 Conditions of Approval

CoA relevant to the preparation of this Program are identified in Table 1. A cross reference is also included to indicate where the requirement is addressed in this Monitoring Program or other documents.

TABLE 1 REQUIREMENTS FOR THE PREPARATION OF THIS MONITORING PROGRAM

Ref	Requirement	Where Addressed
Condition C13	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies (as required by Condition A6) identified for each to compare actual performance of construction of the CSSI against the performance predicted in the documents listed in Condition A1 or in the CEMP. Where a government agency(ies) request(s) is not included, the Proponent must provide the Planning Secretary / ER (whichever is applicable) justification as to why. (a) Noise and vibration: Relevant Councils and WaterNSW (in relation to its assets)	Section 3 Appendix F of the Noise and Vibration Management Sub-plan (NVMP)
Condition C14	Each Construction Monitoring Program must provide:	
	(a) details of baseline data available including the period of baseline monitoring;	Section 4
	(b) details of baseline data to be obtained and when;	Section 4
	(c) details of all monitoring of the project to be undertaken;	Section 5

Ref	Requirement	Where Addressed
	(d) the parameters of the project to be monitored;	Section 5.1.6
	(e) the frequency of monitoring to be undertaken;	Table 7
	(f) the location of monitoring;	Section 5.1.5 DNVIS
	(g) the reporting of monitoring results and analysis results against relevant criteria;	Section 6.3
	(h) details of the methods that will be used to analyse the monitoring data;	Sections 5.1.6 and 5.2.3
	(i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicated unacceptable project impacts;	Section 6.2
	(j) a consideration of SMART principles;	Section 5.1 and 5.2
	(k) any consultation to be undertaken in relation to the monitoring programs; and	Section 3 Appendix F of the NVMP
	(l) any specific requirements as required by Conditions C15 to C16.	N/A
Condition C15	The Noise and Vibration Construction Monitoring Program must include:	
	(a) noise and vibration monitoring at representative residential and other locations (including at the worst-affected residences), subject to property owner approval, to confirm construction noise and vibration levels;	Section 5.1.5 DNVIS
	(b) monitoring undertaken during the day, evening and night-time periods throughout the construction period and cover the range of activities being undertaken;	Table 7
	(c) method and frequency for reporting monitoring results; and	Section 6.3
	(d) a process to undertake real time noise and vibration monitoring.	Sections 5.1.2 and 5.2.2
	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.	Section 5 and 6.3
Condition C17	With the exception of any Construction Monitoring Programs expressly nominated by the Planning Secretary to be endorsed by the ER, all Construction Monitoring Programs must be submitted to the Planning Secretary for approval.	Section 2
Condition C18	The Construction Monitoring Programs not requiring the Planning Secretary's approval must obtain the endorsement of the ER as being in accordance with the conditions of approval and all undertakings made in the documents listed in Condition A1. Any of these Construction Monitoring Programs must be submitted to the ER for endorsement at least one (1) month before the commencement of construction or where construction is staged no later than one (1) month before the commencement of that stage.	Section 2
Condition C19	Any of the Construction Monitoring Programs which require Planning Secretary approval must be endorsed by the ER and then submitted to the Planning Secretary for approval at least one (1) month before the commencement of construction or where construction is staged no later than one (1) month before the commencement of that stage.	Section 2
Condition C20	Unless otherwise agreed with the Planning Secretary, construction must not commence until the Planning Secretary has approved, or the ER has endorsed (whichever is applicable), all of the required Construction Monitoring Programs and all relevant baseline data for the specific construction activity has been collected.	Section 2

Ref	Requirement	Where Addressed
Condition C21	The Construction Monitoring Programs, as approved by the Planning Secretary or the ER has endorsed (whichever is applicable), including any minor amendments approved by the ER, must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary or the ER (whichever is applicable), whichever is the greater.	Section 2
Condition C22	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, ER and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program. Note: Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.	Section 6.3
Condition E54	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 5.2
Condition 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 5.2.2
Condition E84	A suitably qualified and experienced person must undertake condition surveys of all buildings, structures, utilities and the like identified in the documents listed in Condition A1 and the further assessment carried out under mitigation measure GW1 of the Submissions Report as being at risk of damage before commencement of any work that could impact on the subject surface / subsurface structure. The results of the surveys must be documented in a Pre-construction Condition Survey Report for each item surveyed. Copies of Pre-construction Condition Survey Reports must be provided to the relevant owners of the items surveyed in the vicinity of the proposed work, and no later than one (1) month before the commencement of the work that could impact on the subject surface / subsurface structure.	Section 5.4
Condition E85	Condition surveys of all items for which condition surveys were undertaken in accordance with Condition E84 must be undertaken by a suitably qualified and experienced person after completion of the work identified in Condition E84. The results of the surveys must be documented in a Post-construction Condition Survey Report for each item surveyed. Copies of Post-construction Condition Survey Reports must be provided to the landowners of the items surveyed, and no later than three (3) months following the completion of the work that could impact on the subject surface / subsurface structure.	Section 5.4

1.4 Environmental Protection Licence

An Environmental Protection Licence (EPL) will be obtained for the Project. Noise monitoring requirements from the EPL will be incorporated into this Monitoring Program when EPL is approved.

1.5 Construction Environmental Management Framework

The CEMF requirements relevant to the preparation of this Program are identified in Table 2. A cross reference is also included to indicate where the requirement is addressed, in this Program or other documents. The CEMF requires this document be prepared consistently with the CNVS, as such this a cross reference demonstrating compliance with the CNVS is also included in Table 2.

TABLE 2 CEMF REQUIREMENTS

Ref	Requirement	Where Addressed
CEMF 3.16a	Issue specific environmental monitoring will be undertaken as required or as additionally required by any approval, permit or licence conditions.	Section 5
CEMF 3.16a	The results of any monitoring undertaken as a requirement of a license or permit that is required to be published will be published on the Principal Contractor's, or a project specific, website within 14 days of obtaining the results.	Section 1.4
CEMF 8.2c	Noise and vibration monitoring would be undertaken for construction as specified in the CNVS.	Section 1.2
CEMF 8.2d	The following compliance records would be kept by Principal Contractors: i. Records of noise and vibration monitoring results against appropriate NMLs and vibration criteria; and ii. Records of community enquiries and complaints, and the Contractor's response.	Section 5.5
CNVS 6.1	Measurements of sound power level	Section 5.1.6
CNVS 6.2	Monitoring to be undertaken where a DNVS predicts NMLs will be exceeded	Section 5.1.1
CNVS 6.3	Vibration monitoring at affected receiver where exceedance of cosmetic damage criteria and/or human response criteria is expected to be exceeded.	Section 5.2
CNVS 5.1	Where it has been identified that specific construction activities are likely to exceed the relevant noise or vibration goals, noise or vibration monitoring may be conducted at the affected receiver(s) or a nominated representative location (typically the nearest receiver where more than one receiver have been identified). Monitoring can be in the form of either unattended logging or operator attended surveys. The purpose of monitoring is to inform the relevant personnel when the noise or vibration goal has been exceeded so that additional management measures may be implemented.	Sections 5.1 and 6.2

1.6 Revised Environmental Mitigation Measures

The Revised Environmental Mitigation Measures (REMMs) relevant to the preparation of this Program are identified in Table 3. A cross reference is also included to indicate where the requirement is addressed in this Monitoring Program or other documents.

TABLE 3 REMM REQUIREMENTS

Ref	Requirement	Where Addressed
REMM NV2	To avoid potential vibration impacts to the Warragamba to Prospect Water Supply Pipelines, a detailed construction vibration assessment would be undertaken in accordance with the Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines (WaterNSW, 2020) and would consider the following requirements: • Confirm velocity limits for construction activities and the impact the works will have on WaterNSW assets • Excavation methods would be undertaken in accordance with German Standard DIN 4150-3:2016 (2.5 mm/s PPV) • Vibration monitoring would be undertaken prior to and during construction for high risk construction activities • Vibration monitoring reports would be provided to WaterNSW	Section 5.2.1 It is acknowledged that the guidelines have been updated and the revised guidelines will be applied during construction (WaterNSW, Sep 2021)

2 Document Approval

This Noise and Vibration Monitoring Program will be endorsed by the Environmental Representative (ER) in accordance with Condition C19 and submitted to the Planning Secretary for approval no later than one month prior to the commencement of construction.

Construction will not commence until the ER has endorsed and/or the Planning Secretary has approved, all of the Construction Monitoring Programs required under Condition C13. The Noise and Vibration Monitoring Program will be implemented for the duration of construction in accordance with Condition C21.

3 Agency Consultation

Agencies to be consulted for this Monitoring Program are specified in Condition C13, as shown in Table 4 below.

TABLE 4 AGENCY CONSULTATION REQUIREMENTS

Subject	Agency Consultation
Noise and Vibration Construction Monitoring Program (Condition C13)	Relevant Councils (Penrith City Council and Liverpool City Council) and Water NSW (in relation to its assets)

Parklife Metro D&C have engaged with these agencies in developing and finalising this monitoring program. Records of consultation are summarised in Table 5, with further detail provided in Appendix F of the Noise and Vibration Monitoring Plan.

TABLE 5 CONSULTATION LOG

Agency	Date consulted	Comments received	Discussion
Penrith City Council	29/03/2023	28/04/2023	Requested additional detail on monitoring locations, which will be provided in the DNVIS, which will be prepared in accordance with E47.
Liverpool City Council	29/03/2023	26/06/2023	In relation to the NVMP comments were made around the requirement for an EPL, which is discussed in Section 3.4 of the NVMP.
WaterNSW	05/04/2023	24/04/2023	WaterNSW raised various comments directly related to management and assessment of works around the Warragamba to Prospect Water Supply Pipelines, which have been considered and accepted where appropriate.

4 Baseline Data

Baseline noise data was collected for the EIS from February 2020 up until March 2020 at 18 locations for the purpose of obtaining noise data for each Noise Catchment Area (NCA). The methodology and sampling locations are provided in Section 4 of the Noise and Vibration Management Sub-plan. The background noise monitoring data was used to establish the Rating Background Level (RBL) which represents the minimum background sound level for each measurement period. The RBL for each NCA applicable to SSTOM, and each period is provided in Table 6.

TABLE 6 BACKGROUND NOISE MONITORING RESULTS

NCA	Monitoring location	Rating Background Level (RBL) dB(A) ¹			Ambient noise level dB(A) ¹ Leq 15min		
		Day	Evening	Night	Day	Evening	Night
01	NM01	38	(41) 38 ³	(40) 38 ³	53	53	50
03	NM02	37	(40) 37 ³	36	55	59	51
03	NM03	38	32	31	50	41	46
10	NM04*	-	-	-	-	-	-
05	NM05	40	(44) 40 ³	(44) 40 ³	54	51	50

NCA	Monitoring location	Rating Background Level (RBL) dB(A) ¹			Ambient noise level dB(A) ¹ Leq 15min		
		Day	Evening	Night	Day	Evening	Night
07	NM06	42	(44) 42 ³	38	59	57	52
06	NM07	37	37	36	48	49	45
08	NM08	31	(32) 31 ³	30	52	48	40
09	NM09	40	39	34	61	57	54
10	NM10	(30) 35 ²	30	30	47	42	37
11	NM11*	-	-	-	-	-	-
11	NM12	(34) 35 ²	32	(24) 30 ²	58	60	48
12	NM13	38	35	34	58	52	51
04	NM14	35	32	31	48	47	43
08	NM15	44	(47) 44 ³	40	55	53	50
07	NM16	47	42	(28) 30 ²	59	56	54
03	NM17	54	50	36	63	62	59
06	NM18	42	(43) 42 ³	39	55	53	52
07	NM19	53	48	36	62	59	57
11	NM20	39	37	(28) 30 ²	49	47	42

(1) Time periods defined as – Day: 7am to 6pm Monday to Saturday, 8am to 6pm Sunday; Evening, 6pm to 10pm; Night 10pm to 7am Monday to Saturday, 10pm to 8am Sunday

(2) Where background levels are below the minimum assumed rating background noise levels outlined in the NPfI, they have been adjusted to 35dBA during the day period, and 30 dBA during the evening and night periods in accordance with the NPfI

(3) Where evening or night background noise levels exceed that of the previous period, they have been set at the background noise level of the previous period, in line with the NPfI, to reflect community's expectation for greater noise control during more sensitive periods

* Noise monitoring not undertaken due to site access constraints

5 Monitoring

The Monitoring Program has been developed as the key measurement tool to compare actual performance of the SSTOM Works against the predicted performance the EIS and DNVIS's. The Monitoring Program is specific with measurable outcomes and time-based.

All noise and vibration monitoring results would be assessed against the nominated goals and be communicated to the construction personnel. All noise and vibration monitoring reports and data would also be made available to Sydney Metro and the ER, upon request. The monitoring data will also be made available to the EPA and the Planning Secretary upon request.

Noise and vibration monitoring will be undertaken as required by this Monitoring Program, the Conditions, REMMs or the deed, or as directed by the EPA or other relevant government agency. Noise and vibration monitoring may also be undertaken as recommended by Sydney Metro or by the ER.

5.1 Noise Monitoring

Noise monitoring will be undertaken throughout construction to measure potential impacts to nearby receivers, and to determine the effectiveness of noise mitigation measures. Noise monitoring will be undertaken by suitably qualified or experienced members of Parklife Metro D&C, or by specialist acoustic consultants, where appropriate.

Key standards and guidelines relevant to noise monitoring include:

- AS ISO 6393:2019 Earth-moving machinery — Determination of sound power level — Stationary test conditions
- AS2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites
- Australian Standard AS/NZS 2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors
- EN ISO 9641, Part 2, 1996, Acoustics - Determination of sound power levels of noise sources using sound intensity – Part 2: Measurement by scanning. International Organization for Standardization
- NSW Interim Construction Noise Guideline (ICNG)
- EPA's Noise Policy for Industry.

5.1.1 Attended Airborne Noise Monitoring

The following attended noise monitoring will be undertaken:

- At the first opportunity of starting a new construction activity and then monthly at selected sensitive receiver locations that are considered relevant to the works and to determine the effectiveness of mitigation measures against predicted impacts
- Where a noise related complaint is received additional noise monitoring may be undertaken (determined on a case by case basis)
- Where a change of construction methods or techniques is anticipated to result in increased noise
- To confirm the operating sound power level (SWL) of items of plant and machinery (as per the CNVS)
- As required by the EPL
- If requested by an authorised officer of the EPA
- Noise monitoring would be undertaken during the daytime, evening and night-time periods to verify predicted noise levels when works are occurring during those periods, when other representative monitoring data is not available
- As required by a DNVIS and/or the CNVS (AMM).

5.1.2 Unattended Airborne Noise Monitoring

In accordance with Condition C15(d) the process to undertake real-time noise monitoring will be as required by a DNVIS. Real-time (unattended) noise monitoring would be used as a backup for attended noise monitoring. In accordance with the ICNG the duration and amount of noise monitoring will depend on the scale of the construction activities and extent of expected noise impacts. Noise monitoring will cover a representative period of the particular construction activity.

Whilst unattended noise logging locations will be confirmed in the DNVIS for each work area for SSTOM Works, it is likely that unattended noise loggers will be established at St Marys Station and Orchard Hills Station due to the close proximity of construction works to residential properties and other sensitive receivers. Unattended noise logging will target sites with a higher risk for noise impacts to sensitive receivers and will be used as a tool to manage any potential noise impacts throughout construction. Section 5.1.5 provides indicative locations for noise loggers at St Marys Station and Orchard Hills Station, which may change as a result of recommendations in the DNVIS, or as a result of the location of works as SSTOM Works progress. Any change will be

Where actual noise levels are found to exceed the predicted worst-case levels (i.e. an exceedance of more than 2 dB), the source of excessive noise generations will be identified, and any additional feasible and reasonable measures

available will be implemented to either reduce noise emissions or reduce the impacts on receivers. At a minimum, the noise mitigation measures detailed in Section 9 and 10 of the NVMP will be applied as required.

Where a DNVIS has been prepared and it has been predicted that noise levels may be exceed the NMLs at a noise sensitive receiver, and the DNVIS recommends noise monitoring, the monitoring would preferably be conducted at:

- The affected receiver, or
- If more than one affected receiver has been identified, at the nearest affected receiver, or
- Where the nearest affected receiver refuses noise monitoring on their property, at the nearest representative point to that receiver within the site boundary.

5.1.3 Ground Borne Noise Monitoring

Ground-borne noise monitoring is not anticipated for SSTOM Works, however it would be carried out if determined on a case-by-case basis in a DNVIS, via noise modelling completed as by the Parklife Metro D&C, or in response to complaints. The monitoring will be undertaken in the most affected habitable room of the sensitive receiver building and will be conducted in conjunction with vibration measurements whenever practicable. The room selected for noise monitoring should be well shielded from airborne noise intrusions, such as road traffic noise to allow the ground-borne noise to dominate over non-construction generated airborne noise.

5.1.4 Plant/Equipment Noise Checks

Plant/equipment noise checks are required for noise intensive plant and equipment to ensure compliance with the sound power levels (SWLs) for construction equipment assumed in the DNVISs or the levels established in Table 14 of the Noise and Vibration Management Sub-plan. When undertaking site compliance measurements, it is normally the sound pressure level (SPL) that is measured at a specified distance (typically 7m) from the plant or equipment. For all measurements, the plant or equipment under test would be measured while operating under typical operating conditions. If this is not practical, it may be appropriate to conduct a stationary test at high idle.

The plant and equipment to undergo noise checks as part of this Monitoring Program will be those with potential to cause the greatest impact to sensitive receivers, identified as noise intensive plant and equipment. Noise intensive plant and equipment will be identified as those with an SWL $\geq$ 105 dB(A), as shown in Table 14 of the Noise and Vibration Management Sub-plan or as identified in a DNVIS.

Monitoring plant and equipment SWLs will be undertaken with guidance from the Australian Standard AS2012–1977 Method for Measurement of Airborne Noise from Agricultural Tractors and Earthmoving Machinery.

In the case of an exceedance in SWL, the item of plant or equipment would undergo maintenance, be replaced, or the advice of a specialist acoustic consultant would be sought to provide suitable mitigation measures.

A register of measured SWLs for each item of plant would be kept for reference where future noise audits are conducted. Where plant and equipment are identified to have a higher SWL than currently utilised in noise predictions and noise modelling, this information would provide feedback for updating those modelling tools.

5.1.5 Noise Monitoring Locations

The monitoring locations are selected to cover each NCA applicable to SSTOM Works, and to target the most noise impacted sensitive receivers. These locations will be reviewed during construction and amended, if necessary, based on proximity to key construction zones and most potentially affected sensitive receiver/s. The actual noise monitoring locations will be selected from the impacted receivers identified in the DNVIS or other activity-specific noise modelling.

Unattended noise logging locations will also be confirmed in the DNVIS for each work area for SSTOM Works. Unattended noise logging will target sites with a higher risk for noise impacts to sensitive receivers and will be used as a tool to manage any potential noise impacts throughout construction. Indicatively, Figure 1 and Figure 2 below provide the indicative fixed noise logging locations for St Marys and Orchard Hills, which have been identified as the sites with higher risk for noise impacts due to the proximity to sensitive receivers.

Any changes to monitoring locations will be detailed in the DNVIS or where the monitoring location is not described in a DNVIS, it will be approved by the Parklife Metro D&C Environment Manager in consultation with the Parklife Metro D&C specialist acoustic consultant and with Sydney Metro and the ER, as required.



FIGURE 1 INDICATIVE NOISE LOGGING LOCATION AT ST MARYS



FIGURE 2 INDICATIVE NOISE LOGGING LOCATION AT ORCHARD HILLS

5.1.6 Noise Monitoring Equipment and Methods

All monitoring will be undertaken by competent personnel, suitability trained and experienced in undertaking noise measurements. Noise monitoring siting will be selected in accordance with the Noise Policy for Industry (2017), wherever possible. Noise monitoring equipment used will be at least Type 2 instruments and calibrated in accordance with manufacturer specifications or relevant Australian Standards. The calibration of the monitoring equipment will be checked in the field before the noise measurement period.

Acoustic instrumentation employed in the noise monitoring surveys will comply with the requirements of AS 61672.1:2019 Electroacoustics – Sound level meters specifications and carry appropriate NATA (or manufacturer) calibration certificates. Advice from a heritage specialist will be sought on methods and locations for installing equipment used for noise monitoring at heritage-listed structures.

Noise measurement will be taken with the following meter settings:

- Time Constant: Fast (i.e. 125 milliseconds)
- Frequency Weightings: A-weighting.

The minimum range of noise metrics to be recorded for attended noise monitoring are L90, L10, Leq, and Lmax.

Meteorological conditions during the noise monitoring period, such as wind velocity, wind direction and rainfall will be recorded from the nearest weather station to the project site, including:

- Badgerys Creek AWS (Station ID 067108), or
- Horsley Park Equestrian Centre AWS (Station ID 067119).

Alternatively, local windspeed can be measured on site using a handheld anemometer.

Where the maximum wind speed exceeds 5 m/s and noise measurements are required, caution should be applied as described in the AS 1055:2018 Acoustics - Description and measurement of environmental noise. Measurements of noise should be disregarded during rain periods, except as described in the AS 1055:2018. Where monitoring cannot be carried out due to adverse weather, arrangements should be made to complete the monitoring as soon as conditions allow.

Monitoring requirements and frequency during construction are summarised in Table 7.

5.2 Vibration Monitoring

Vibration monitoring will be undertaken throughout construction to measure potential impacts to nearby receivers and structures, and to determine the effectiveness of mitigation measures. Vibration monitoring will be undertaken by suitably qualified or experienced members of Parklife Metro D&C, or by specialist acoustic consultants, where appropriate.

Key standards and guidelines relevant to vibration monitoring include:

- BS 6472, 1992, Evaluation of Human Exposure Vibration in Buildings. The British Standards Institution
- BS 7385 Part 2, 1993, Evaluation and Measurement for Vibration in Buildings Part 2. The British Standards Institution
- DEC, 2006, Assessing Vibration: a technical guideline. NSW Environment Protection Authority
- NSW Interim Construction Noise Guideline (ICNG)
- EPA's Noise Policy for Industry.

5.2.1 Attended Vibration Monitoring

The following attended vibration monitoring will be undertaken:

- To confirm the site-specific minimum working distances or mitigation measures for vibration intensive plant/equipment at the commencement of operation for each plant, as determined (on a case-by-case basis) via the noise and vibration management tool (Section 8.4 of the NVMP) or DNVIS.
- For the protection of buildings and heritage items (St Marys Railway Station Group, Queen Street Post-War Commercial Building, St Marys Munitions Workers Housing, McGarvie Smith Farm and McMaster Farm) monitoring will be carried out at the commencement of vibratory compaction work and any rock-breaking within 50 metres of buildings to ensure that safe vibration working distances specified in Table 19 of the Noise and Vibration Management Sub-plan are not exceeded and to confirm safe working distances.
- Vibration monitoring may be carried out in response to a complaint an exceedance, or for the purpose of refining construction methods or techniques to minimise vibration impacts
- As required by a DNVIS and/or the EPL
- Prior to and during construction for construction activities that has the potential to impact on the Warragamba to Prospect Water Supply Pipeline (in accordance with a DNVIS).

Where the SSTOM Works interacts with the Warragamba to Prospect Water Supply Pipelines and in accordance with Condition E121 and REMM HR4, Parklife Metro D&C will apply the vibration criteria consistent with the German Standard DIN 4150-3:2016 'Structural Vibration Part 3: Effects of Vibration in Structures', as per consultation with WaterNSW. Specifically, the maximum allowable limit of vibration acceptable at the water supply infrastructure will be those listed in line 3 of Table 1 of the DIN4150-3.

In accordance with REMM NV2 a DNVIS would be prepared in accordance with the WaterNSW Guideline to avoid any potential for vibration impacts upon the Warragamba to Prospect Water Supply Pipelines. Any vibration monitoring required must not permanently affix monitoring equipment to the assets, nor include spray marking paint on assets or any changes to assets (i.e. drilling holes to affix monitoring devices). Adequate consideration will be given to determining how the monitoring devices will be placed, and will be determined by an appropriately qualified and experienced person and detailed in the DNVIS prior to undertaken the work. Vibration monitoring report will be provided to WaterNSW.

5.2.2 Unattended vibration monitoring

Longer-term unattended monitoring in real time may be conducted in the following situations:

- Where there is a requirement to work within safe working distances for a longer period of time, and/or
- Where attended monitoring has demonstrated that there is a reasonable risk of exceeding the established vibration criteria at sensitive receivers or structures.

Longer-term monitoring would be carried out in accordance with the DNVIS for the work.

If vibration monitoring equipment is required to be installed on any heritage listed structure, advice would be sought from a heritage specialist on methods and locations for installing any equipment.

All heritage items are included in the Environmental Control Maps, which may be updated from time to time throughout the SSTOM Works.

5.2.3 Vibration Monitoring Equipment and Methods

The minimum range of vibration metrics to be recorded is the following:

- Root-Mean-Square acceleration (RMS), or
- Peak Particle Velocity (PPV).

Attended vibration monitoring will be undertaken when checking the safe working distances from construction plant (e.g. compaction plant), to confirm vibration levels as required by the DNVIS or in response to a complaint.

The testing method includes:

- Monitoring to be conducted for at least three distances from the plant, including a representative distance for the nearest sensitive structures and/or receivers, where possible
- The testing will be conducted at each location to obtain a suitable representation of the range of vibration levels that would occur from the tested plant, where possible
- The plant will be tested in the settings in which it is expected to operate. For vibratory rollers this may include both “High” and “Low” settings.

The Peak Particle Velocity (PPV) vibration levels and the dominant frequency of the vibration will be recorded for assessment against the structural and cosmetic damage criteria. In situations in which human comfort is also of concern, the Root-Mean-Square acceleration (RMS) vibration level should also be recorded.

5.3 Noise and Vibration Monitoring Summary

Noise and vibration monitoring that will be undertaken for the SSTOM Works is summarised in Table 7 below.

TABLE 7 NOISE AND VIBRATION MONITORING SUMMARY

Monitoring details	Frequency	Responsibility
Inspections		
Inspection of works to ensure that noise and vibration mitigation measures are being implemented onsite	Weekly	Environment Manager
Attended noise monitoring		
Attended noise monitoring at monitoring locations identified.	At the commencement of works and at commencement of new noisy activities, and then regularly, as required	Environment Manager
In response to a complaint, if monitoring is considered an appropriate response to determine if noise levels exceed predicted construction noise levels	As required	Environment Manager

Monitoring details	Frequency	Responsibility
If requested by an authorised officer of the EPA		
Plant and equipment checks	Significant noise generating items of plant would monitored at the first opportunity and Then 6-month intervals thereafter Spot checks of noise intensive plant where it is required to check noise emission against manufacturer's specifications.	Environment Manager
Spot checks for worst-case noise impact scenarios or when new predicted high noise impact activities commence	As required by a DNVIS	Environment Manager
Attended vibration monitoring		
At start of vibration intensive works, such as compaction work or rock breaking, where there is potential for exceedances of the vibration criteria	As required or At start of vibratory vibration intensive works as specified in the DNVIS	Environment Manager
Plant and equipment checks	At the commencement of vibration intensive activities on site that have been identified in a DNVIS or by the noise and vibration management tool as likely to exceed the vibration screening level	Environment Manager
In response to a complaint, if monitoring is considered an appropriate response to determine if vibration levels exceed predicted construction noise levels If requested by an authorised officer of the EPA	As required	Environment Manager
Prior to and during construction for construction activities identified by the DNVIS to have the potential to exceed vibration limits (including the Warragamba to Prospect Water Supply Pipeline)	As required by DNVIS	Environment Manager

5.4 Pre and Post Construction Condition Surveys

Building surveys will be undertaken by a suitably qualified and experienced person, targeting any building, structure or utility identified as being at risk of damage from construction works.

At a minimum, conditions surveys will comprise:

- Inspector's qualifications and expertise
- A visual inspection of the structure, including all internal and external walls, ground level floors and external pavements, all connections of other structures above ground level and their connection at ground level and any exposed foundations
- Full written report outlining condition of internal and external components of each property
- A series of photographs of each identified defect/crack
- A sketched floor plan showing exact locations of defect and measurements of crack width/defect size
- Identification of any condition changes relative to pre-construction and the likely cause of the change (post-construction only).

Building condition surveys would initially identify buildings and structures that can be categorised and structurally unsound, which would be confirmed through further inspection and investigation, which would then have the conservative vibration criteria applied. The Pre-Construction Condition Survey Reports will be provided to the owner of the structures surveyed.

After completion of the works, post-condition surveys of all structures/assets for which Pre-Construction Condition Surveys were undertaken, will be completed by a suitably qualified person. The Post Construction Condition Survey Reports will be provided to the owner of the structures surveyed.

5.5 Documentation

The following information will be recorded for each monitoring event:

- Date and time of measurement
- Name of person taking the measurement
- Type and model of instrument/equipment
- Sample times, measurement time intervals and time of day
- Map illustrating the measurement location, source location and sensitive receivers
- Operation and load conditions of plant
- Measured noise parameters including Leq, Lmax, L10 and L90, or vibration parameters recorded
- Weather conditions that may impact monitoring efforts
- An estimate of the SSTOM Works noise and/or vibration contribution versus other sources.

Additional documentation that will be recorded and maintained will include:

- Records of noise and vibration monitoring results against appropriate NMLs and vibration criteria
- Records of community enquiries and complaints, and the Contractor's response.

6 Compliance Management

6.1 Roles, Responsibility and Training

All noise and vibration monitoring will be carried out by an appropriately trained and competent person in the measurement and assessment of construction noise and vibration, who is familiar with the requirements of the relevant standards and procedures, detailed in the NVMP. Training will be undertaken by the Project Noise and Vibration consultant as required. Records of any training carried out will be recorded in the Competency Management System

6.2 Data analysis and management response

Results obtained from monitoring activities will be compared against the noise and vibration goals listed in the NVMP and the DNVIS. If an exceedance is observed, a review will be undertaken to determine possible causes. The review will include the following actions:

- Cease the noise and/or vibration generating source which causes the exceeded predictions
- Confirm the monitored levels are not being impacted by other (non-SSTOM related) noise or vibration sources
- Confirm if the exceedance is due to an uncharacteristically loud piece of equipment
- Identify if the equipment can be swapped out for another piece of equipment or alternative equipment or plant, or if additional mitigation can be included in the site design
- Confirm that the modelling reflects the actual activity being undertaken
- Confirm that the noise and vibration management and mitigation measures (Section 9 of the NVMP and specific mitigation and management measures identified any relevant DNVIS) have been implemented

- Implement other feasible and reasonable measures which may include reducing plant size, modifying time of works, changing operational settings (such as turning off the vibratory function of the machine), and utilising alternative construction methodology or a combination of these
- Review work practices to ensure compliance with the management levels set out in the CNVP
- Ensure that the learnings from the above are fed back into the noise modelling assessment process for fine-tuning
- Continue work where impacts can be reduced
- Communicate lessons learnt to relevant personnel.

If the exceedance is determined to be attributable to Project works, the event will be treated as an environmental incident and managed in accordance with the requirements of the CEMP. If monitoring during construction indicates exceedance of the vibration criteria identified in the DNVIS, or levels otherwise determined as appropriate by a suitably qualified structural engineer, then all vibration generating construction activities will cease immediately and will not resume until a revised method of construction is established that will ensure protection of affected buildings, heritage items or other structures.

6.3 Reporting

During construction, noise and vibration monitoring data will be collected, tabulated and assessed against the criterion identified in the DNVIS, or against the applicable NML or vibration targets. Results from monitoring undertaken as part of this Monitoring Program will be used to inform project reporting requirements detailed in Section 3.9 of the CEMP, as required.

6.3.1 Construction Monitoring Report

The Construction Monitoring Report will include data summary tables from monitoring undertaken during the applicable reporting period, as well as identifying exceedances and management responses to any exceedances which may have occurred during that reporting period.

The Construction Monitoring Reports will be submitted to the Planning Secretary, ER, Water NSW (where applicable and in accordance with REMM NV2) and the EPA upon request, in accordance with Condition C22. The Construction Monitoring Reports will be submitted six-monthly for the duration of SSTOM Works.

6.3.2 Reporting Non-conformances and exceedances

If monitoring results determine that there has been an exceedance of the noise and vibration targets, which constitutes an incident or non-compliance, then the reporting requirements detailed in Section 3.8 and 3.9 of the CEMP will be followed. Parklife Metro D&C will investigate the exceedance and determine whether the exceedance was attributable to SSTOM Works. If determined to be attributable to SSTOM Works, the exceedance will be classified in accordance with Section 3.8 of the CEMP and the Sydney Metro Environmental Incident Classification and Reporting Procedure.

In accordance with Condition A44, the Planning Secretary will be notified in writing via the Major Projects website within seven days after becoming aware of any non-compliance. The notification will identify the project and application number, set out the conditions of approval in which a non-compliance has been identified, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance, in accordance with Condition A45.

It is noted that in accordance with the POEO Act, a pollution incident does not include an incident or set of circumstance involving only the emission of any noise. As a result, noise exceedances cannot be classified as a Material Harm incident and do not require incident notification and reporting in accordance with Condition A41 and A42.

Appendix C Initial Land Use Survey

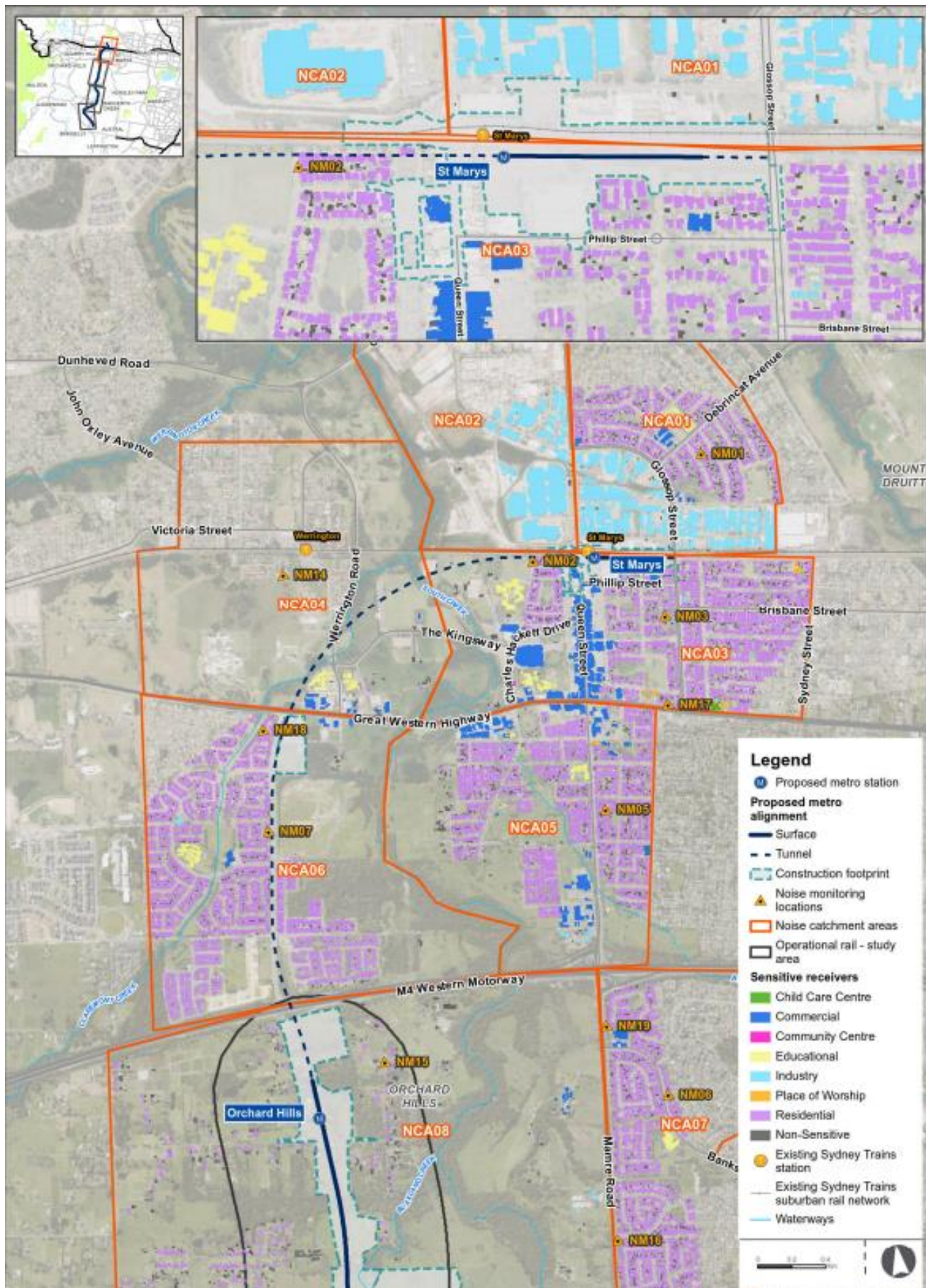


FIGURE C1 NOISE CATCHMENT AREAS AND SENSITIVE RECEIVER LOCATIONS

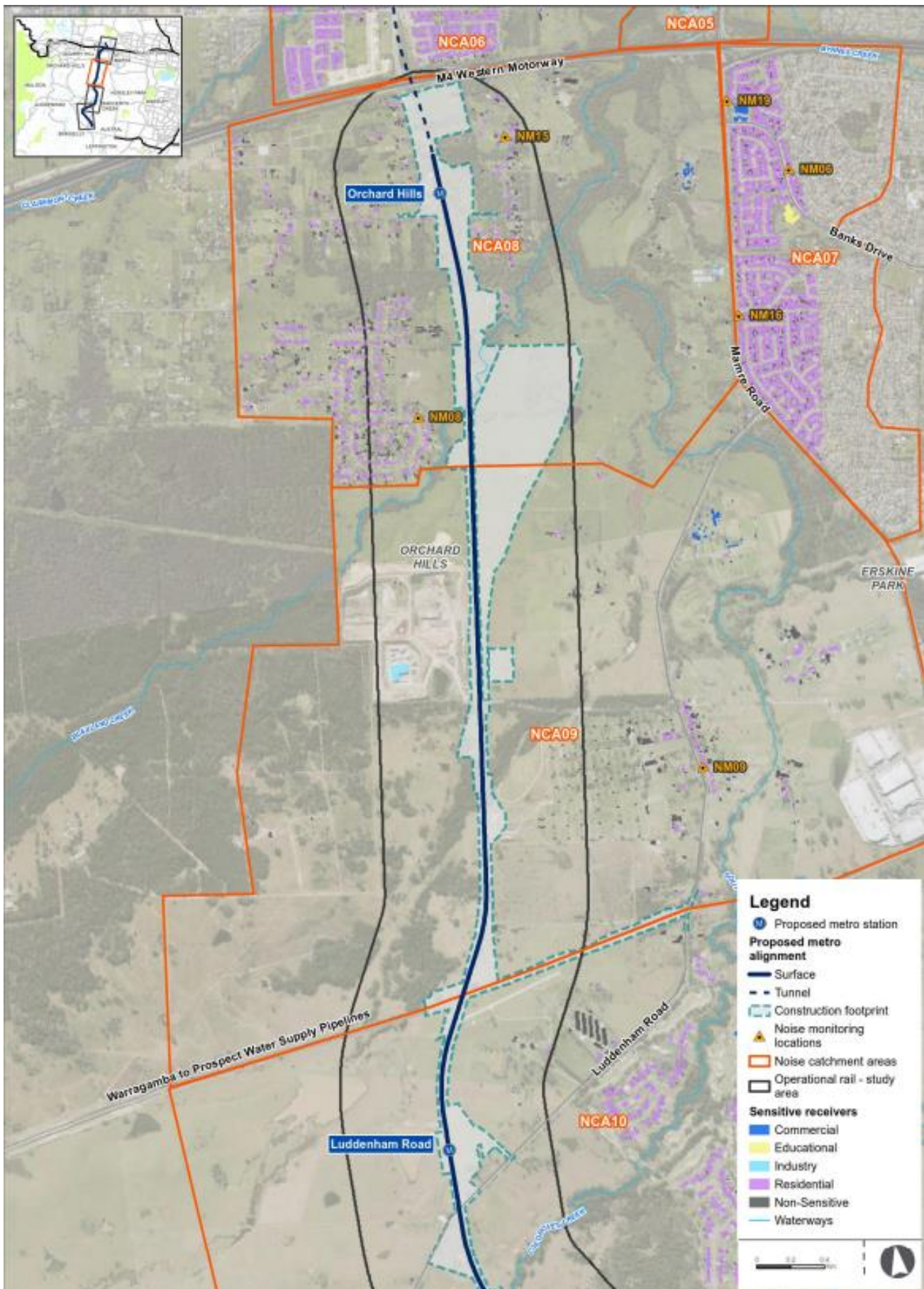


FIGURE C2 NOISE CATCHMENT AREAS AND SENSITIVE RECEIVER LOCATIONS

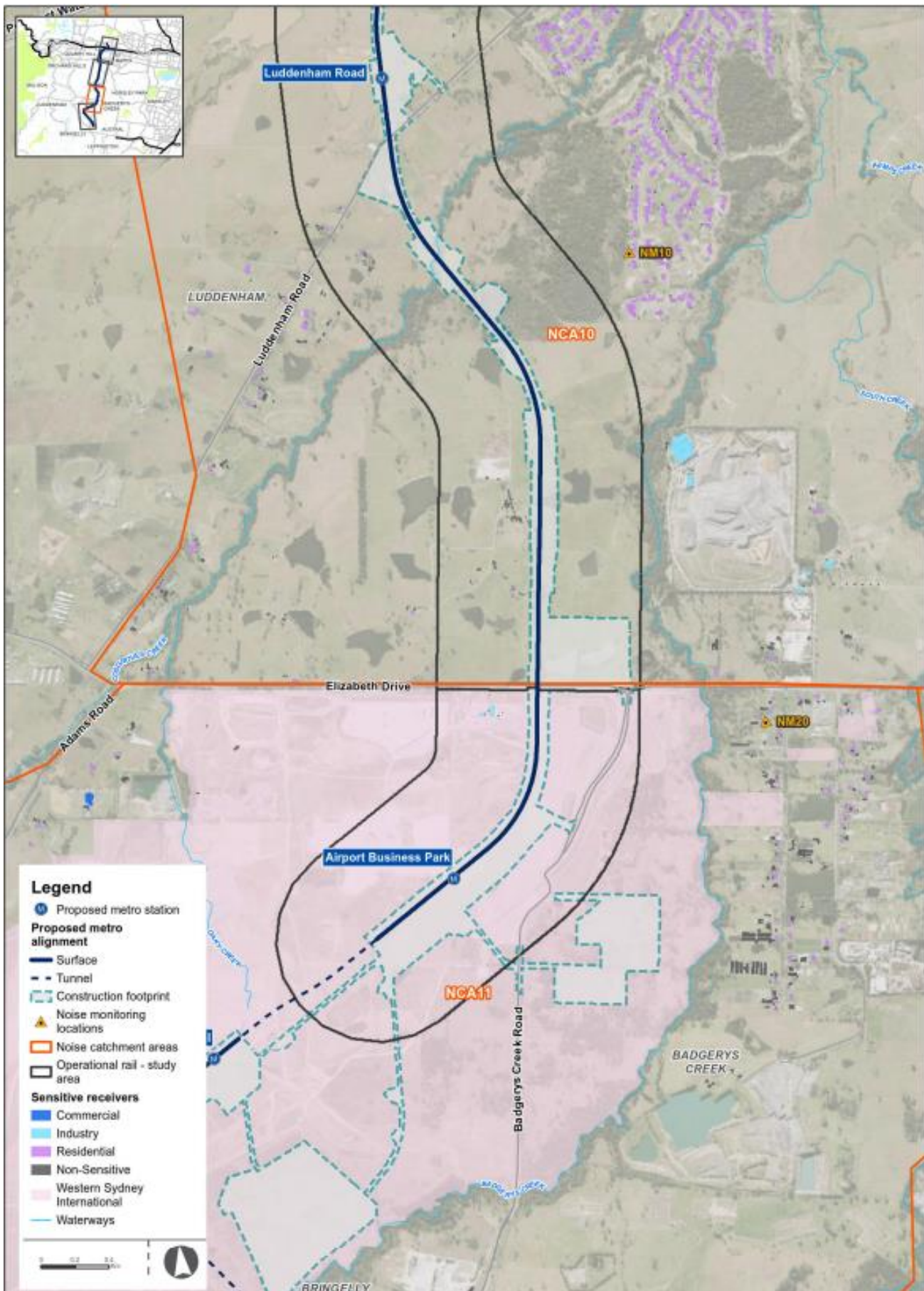


FIGURE C3 NOISE CATCHMENT AREAS AND SENSITIVE RECEIVER LOCATIONS

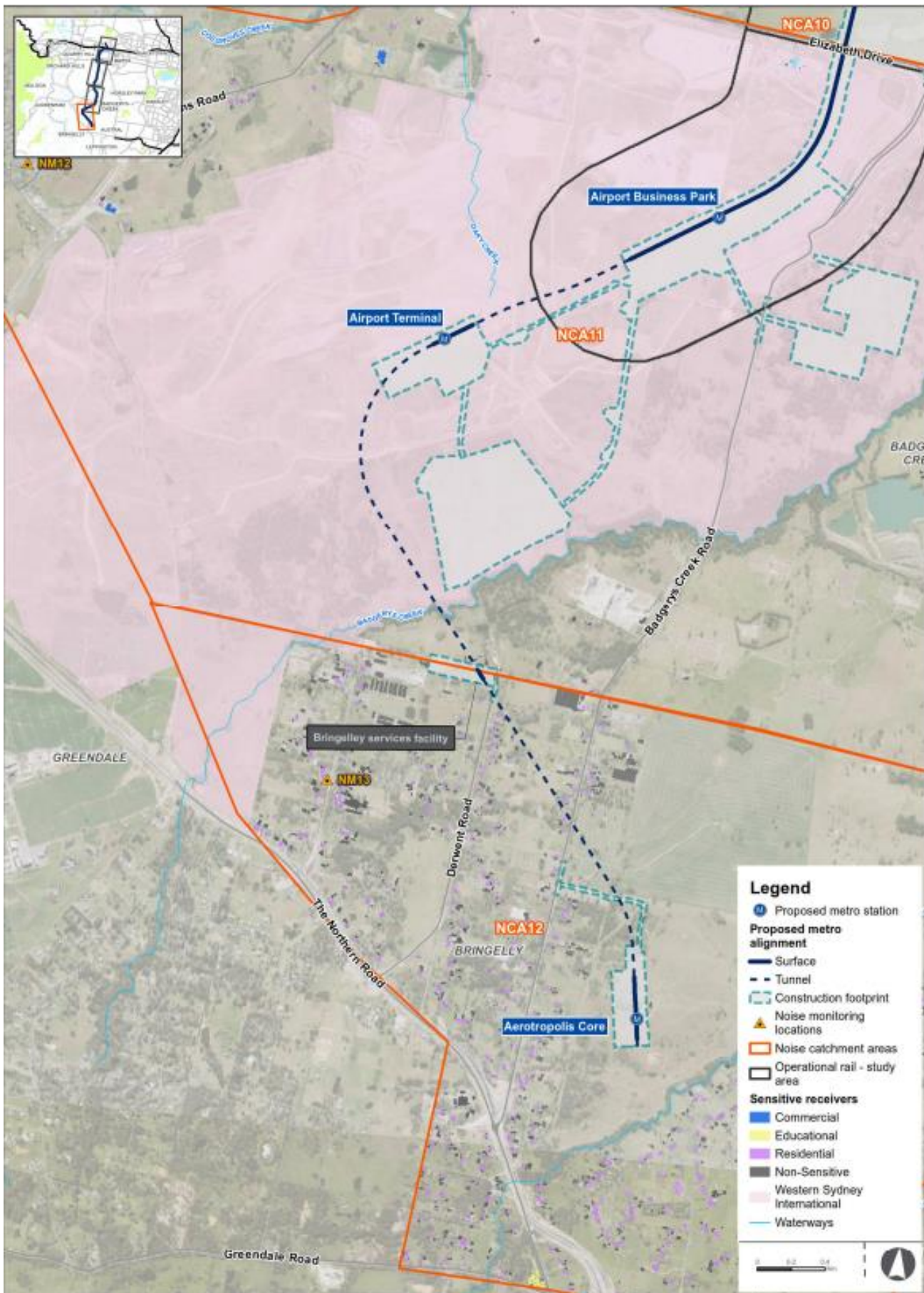


FIGURE C4 NOISE CATCHMENT AREAS AND SENSITIVE RECEIVER LOCATIONS

Appendix D Out of Hours Work Protocol



Sydney Metro Western Sydney Airport Out-of-hours Work Protocol

SM-21-00306108

Sydney Metro Integrated Management System (IMS)

Applicable to:	Sydney Metro Western Sydney Airport
Document Owner:	Environment Manager
System Owner:	Director Environment, Sustainability & Planning – Sydney Metro - Western Sydney Airport
Status:	Final
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1. Definitions and acronyms

All terminology in this document is taken to mean the generally accepted or dictionary definition. Other terms and jargon specific to this document are defined within the [SM-17-0000203 Sydney Metro glossary](#). Acronyms and terminology specifically used throughout this document are listed below.

	Definitions
CEMF	Construction Environment Management Framework https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272123288
CNVS	Construction and Noise Standard https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272123288
CNVMP	Construction Noise and Vibration Management Plan
CoA	Conditions of Approval
CSSI	Critical State Significant Infrastructure
DNVIS	Detailed Noise and Vibration Impact Statement
DPIE	Department of Planning, Industry and Environment (formerly DPE)
EIS	Environmental Impact Statement
EPA	Environment Protection Authority (of New South Wales)
EPL	Environment Protection Licence
ER	Environmental Representative
ICNG	<i>Interim Construction Noise Guideline</i> (DECC, 2009)
MOD	Modification (to a planning approval)
OOH	Out-of-hours (i.e. outside of the standard construction hours stipulated in planning approval conditions)
POEO Act	<i>Protection of the Environment Operations Act 1997</i> (NSW)
REMM	Revised Environmental Mitigation Measure
SBOEP	Small Business Owners Engagement Plan
Secretary	The Secretary of the New South Wales Department of Planning, Industry and Environment
SM-WSA	Sydney Metro - Western Sydney Airport

2. Introduction

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

- Sydney Metro - Western Sydney Airport (SSI_10051)

2.1. Purpose

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

Table 1: Out-of-hours Work CSSI CoAs

Condition Number	Condition	Where this condition is addressed
E37	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 2.3.2.3 Detailed Noise and Vibration Impact Statement Construction Noise and Vibration Standard
E38	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 3.0 Standard hours
E39	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.	Construction Noise and Vibration Standard
E40	This approval does not permit blasting.	Section 4.0 OOH Work
E41	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	Section 4.0 OOH Work Construction Noise and Vibration standard

	(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 (d) By Prescribed Activity, including: (i) tunnelling and ancillary support activities (excluding cut and cover tunnelling and surface works not directly supporting tunneling) are permitted 24 hours a day, seven days a week; or (ii) grout batching at the Orchard Hills construction site is permitted 24 hours per day, seven days per week; or (iii) delivery of material that is required to be delivered outside of standard construction hours in Condition E38 to directly support tunnelling activities, except between the hours 10:00 pm and 7:00 am to / from the Orchard Hills ancillary facility; or (iv) haulage of spoil generated through tunnelling is permitted 24 hours per day, seven days per week except between the hours of 10:00 pm and 7:00 am to / from the Orchard Hills construction site; or (v) works within an acoustic enclosure are permitted 24 hours a day, seven days a week where there is no exceedance of noise levels or intermittent vibration levels under Low impact circumstances identified in Condition E41(b), unless otherwise agreed with the Planning Secretary; or (vi) tunnel and underground station box fit out works are permitted 24 hours per day, seven days per week. On becoming aware of the need for emergency work in accordance with (a)(ii) above, the ER, the Planning Secretary and the EPA must be notified of the reasons for such work. The Proponent must use best endeavours to notify as soon as practicable all noise and/or vibration affected sensitive land user(s) of the likely impact and duration of those work. Notes: 1. Tunnelling does not include station box excavation. 2. Tunnelling ancillary support activities includes logistics support and material handling and delivery	
E42	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	This document Section 4.0 OOH Work Construction Noise and Vibration Standard

(Uncontrolled when printed)

	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 and the section within this protocol ss 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: <i>Out-of-hours work is any work that occurs outside the construction hours identified in Condition E38 and E39.</i>	4.2.2.6 Approval Notification Arrangements
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 2.3 Governance Section 4.5 Ground-borne noise level exceedance Construction Noise and Vibration Standard
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 2.3 Governance Construction Noise and Vibration Standard
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	Section 2.3.2.3 Detailed Noise and Vibration Impact Statements Construction Noise and Vibration Standard

	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.	
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 commence 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 2.3 Governance Construction Noise and Vibration Standard
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. 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 4.2.2 and 4.3 Communications Construction Noise and Vibration Standard

2.2. Document Requirements

The Out-of-hours Work Protocol needs to meet the following consultation, endorsement and approval requirements in accordance with the Sydney Metro - Western Sydney Airport CoAs

- Be prepared in consultation with the Environmental Representative (ER); and
- Be approved by the Planning Secretary of the NSW Department of Planning, Industry and Environment (the Secretary).

These requirements were complied with as demonstrated in Sections 2.2.1.

2.2.1. ER Endorsements and Approval

This document has been prepared in consultation with and reviewed and endorsed by the ER. Copies of the ER endorsements are provided in Appendix A.

2.2.2. Secretary Approval

In accordance with CSSI 10051 CoA E42, construction will not commence for OOH works that are not subject to an EPL prior to this document's preparation and submission to the Secretary for approval.

2.3. Governance

This document should be used in conjunction with the Construction Environmental Management Framework, [https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272116977_Construction Noise and Vibration Strategy](https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272116977_Construction_Noise_and_Vibration_Strategy) and any applicable EPLs. These documents establish minimum requirements for managing noise and vibration impacts on the SM-WSA project.

2.3.1. Construction Environment Management Framework

The CSSI planning approval includes [SM-21-00279320 Construction Environment Management Framework](https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272116977) <https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272116977> in its documentation. The CEMF represents Sydney Metro's minimum requirements for environmental management and specifies a standard framework that each contractor must establish and document in their Construction Environmental Management Plan and sub-plans. These requirements, including those relating to construction noise and vibration management, are specified in Chapter 9.

2.3.2. Construction Noise and Vibration Standard

The Construction Noise and Vibration Standard (CNVS) <https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272123288> establishes a framework for managing construction noise and vibration impacts and adopting appropriate mitigation measures (including minimum requirements);

- Is included in the CSSI planning approval documentation;
- Forms part of the contract requirements that contractors must comply with;

- Defines a minimum standard for managing noise and vibration impacts that considers current best practice guidelines and other regulatory requirements; and
- Sets minimum requirements for all OOH work, including the need for and development of Construction Noise and Vibration Management Plans, Construction Noise and Vibration Impact Statements and Detailed Noise and Vibration Impact Statements.

2.3.2.1. Construction Noise and Vibration Management Plans

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

2.3.2.2. Detailed Noise and Vibration Impact Statement

A Detailed Noise and Vibration Impact Statement (DNVIS) is a document developed by Contractors which assesses and documents the anticipated noise and vibration impacts at receivers of proposed construction activities. In accordance with the CSSI planning approvals, a DNVIS is to be prepared for each construction site before construction noise and vibration impacts commence 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 receivers. It also clarifies assumptions made in the EIS and allows the Contractor to provide more detailed quantitative assessments of the EIS due to their better understanding of the exact equipment list and construction methodology they will be using to complete the scope of works.

2.3.3. Environment Protection Licence

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

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

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

OOH work that is subject to an EPL does not require an 'OOH approval' prior to the

commencement of the proposed OOH works in accordance with the CSSI planning approval conditions.

2.4. Roles and Responsibilities

2.4.1. Sydney Metro - Western Sydney Airport Director of Sustainability, Environment & Planning

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

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

2.4.2. Sydney Metro Environment Manager

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

2.4.3. Place manager

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

2.4.4. Independent Environmental Representative

The CSSI planning approval conditions under CoA A32 requires an Environmental Representative (ER) to be appointed to the project prior to work commencing. The ER is to act as an independent point of contact for all environmental and planning approval compliance matters. Refer to A32 for a comprehensive list of the ER's responsibilities under CSSI 10051.

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

3. Standard Hours

The SM-WSA CSSI planning approval conditions define standard construction hours as:

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

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

3.1. Covid Health Orders

Due to the Covid-19 pandemic affecting Sydney, the NSW Government has issued a number of Health Orders to assist in the population living through Covid. In order to assist infrastructure projects, the Government has issued the COVID Infrastructure Construction Work Days Order (2020-2020-75). This Order allows an infrastructure Project to work the following hours as Normal Hours:

- 7:00am to 6:00pm, Saturdays, Sundays or public holidays for works inclusive.

These Orders are subject to updates, with the latest update being:

Environmental Planning and Assessment (COVID-19 Development—Infrastructure Construction Work Days No. 2) Order 2020.

Condition 6 of this Order specifies the following for Infrastructure construction work days:

(1) The carrying out of any building work or work, or the demolition of a building or work, on a Saturday, Sunday or public holidays is development specified for this Order.

(2) The conditions specified for the development are that the development must—

(a) be the subject of an approval, and

(b) comply with all conditions of the approval other than any condition that restricts the hours of work or operation on a Saturday, Sunday or public holiday, and

(c) for work or operation on a Saturday, Sunday or public holiday—

(i) comply with the conditions of the approval that restrict the hours of work or operation on any other day as if the conditions applied to work or operation on a Saturday, Sunday or public holiday, and

(ii) not involve the carrying out of rock breaking, rock hammering, sheet piling, pile driving or similar activities during the hours of work or operation that would not be permitted but for this Order, and

(iii) take all feasible and reasonable measures to minimise noise.

These orders are for a finite time and may be updated again. The Project is to work to the conditions of any updates as they are issued.

4. OOH Work

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

CoA E40 applies to OOH work and is not allowed during normal or OOH.

In accordance with CoA E41 any type of OOH work is permitted to be undertaken on the SM-WSA project provided that it is subject to this document.

A list of work activities that may typically be undertaken OOH is provided below:

- (a) Work which could result in a high risk to construction personnel or public safety, based on a risk assessment carried out in accordance with AS/NZS ISO 31000:2009 “Risk Management Principles and Guidelines”; or
- (b) where the relevant road authority has advised the Proponent in writing that carrying out the activities could result in a high risk to road network operational performance; or
- (c) where the relevant utility service operator has advised the Proponent in writing that carrying out the activities could result in a high risk to the operation and integrity of the utility network; or
- (d) where the Transport for NSW Transport Management Centre (or other road authority) has advised the Proponent in writing that a road occupancy licence is required and will not be issued for the activities during the hours specified in Conditions E19 and E20; or
- (e) where Sydney Trains (or other rail authority) has advised the Proponent in writing that a Rail Possession is required.

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

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

Further guidance on the provision of justification is provided in the Out-of-hours application form (refer to Section 4.2.2). Normally, program acceleration is normally not a justifiable reason to undertake works OOH, however in these times of Covid, with health restrictions, program acceleration may be acceptable.

4.1. OOH Work Endorsement and Approval

In accordance with CoA E42 and with the exception of OOH work that is subject to an EPL, all OOH work subject to the planning approval requires approval by either the ER, or in the case of ‘high risk’ works approval by the Secretary.

In accordance with CoA E42(b) OOH work that is subject to the planning approval and not subject to an EPL only require approval from the ER, or in the case of ‘high risk’ works approval by the Secretary.

4.2. OOH Work Approval Process

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

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

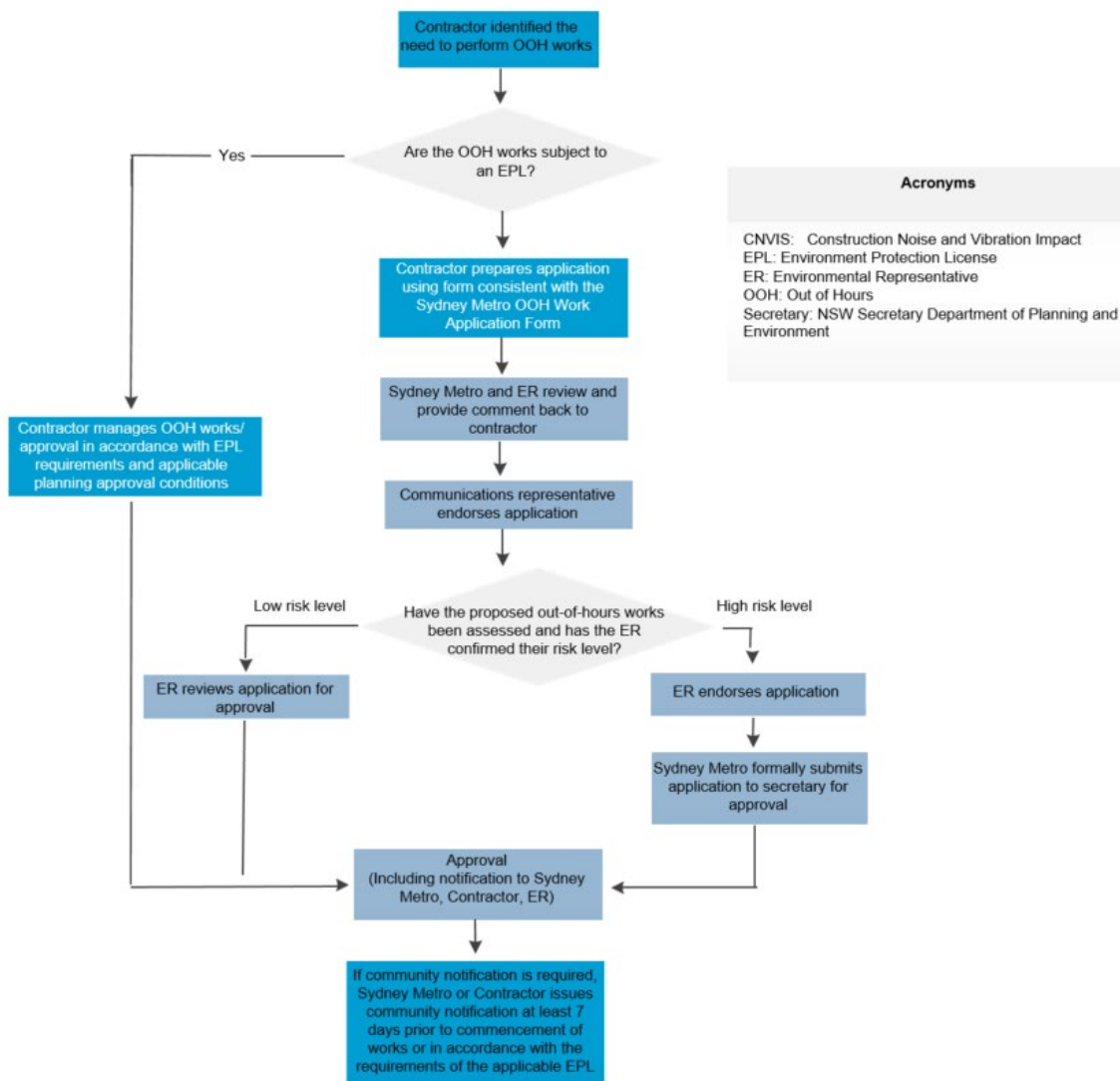


Figure 1: OOH Work Approval Process

4.2.1. OOH Work subject to an EPL

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

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

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

4.2.2. OOH Work not subject to an EPL

For OOH work that is not subject to an EPL, the approval process is dictated by CoA E42.

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

Where Third Party permits (e.g. Road Occupancy Licences and/or rail possessions) require works to be undertaken OOH, these works will be exempt from classification as 'high risk' (described under section 4.2.2.3) and will be subject to approval by ER as required under CoA E42 in accordance with the 'Low Risk' approval pathway. Evidence of Third Party approval applicable to the works, specifying the time that the works must be undertaken must be included as part of application.

4.2.2.1. Respite

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

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

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

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

In the event that respite is determined to be implemented for works that are subject to the planning approval, respite will be implemented to meet the intent of CoA E39 as applicable and so far is reasonable and practicable.

4.2.2.2. Review

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

4.2.2.3. Communications Endorsement and Default Risk Level Identification

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

Following this person's endorsement, the ER is required to consider the applicant's risk level for the proposed OOH work and determine whether this risk level is appropriate. Once the ER has considered the applicant's risk level, the ER indicates the risk level of the proposed OOH work in its own professional judgement in accordance with CoA E42. This risk level will be categorised as either 'Low risk' or 'High risk'.

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

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

These criteria are based on Section 3.1 of the CNVS.

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

4.2.2.4. Modification of Default Risk Level

Using the default risk level as a 'starting point', the ER will consider all other relevant factors in order to identify a final risk level. These relevant factors include:

- Those identified in Section 3.1 of the CNVS (noting that the reference to 'impact levels' is different from the 'risk level' with respect to CoA E42(b));
- Those listed in Table 2 of this document;
- Third Party permits; and
- Any other factors the ER considers relevant in their professional opinion.

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

Once the ER has identified a final risk level for the OOH work application, the ER indicates the risk level on the application (including any risk identification commentary). Depending on the risk level that has been determined, the ER either signs and dates the OOHs application if works are determined to be low risk, or endorses the OOH application for Sydney Metro to formally submit the OOH application to the Planning secretary for approval.

4.2.2.5. Other Endorsements and Approval

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

If the ER identifies that the OOH work application is high risk, the application is forwarded to the Secretary for approval. This endorsement represents an agreement from the ER that the OOH works have been proposed in accordance with the relevant requirements and that additional mitigation measures (including respite) have been appropriately considered and proposed for implementation. Following the ER's endorsement, the application is then formally submitted by Sydney Metro to the Secretary for approval in accordance with CoA E42.

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

4.2.2.6. Approval Notification Arrangements

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

Table 2: Risk Level Considerations

Risk Level Considerations	
Predicted Noise Exceedance	Degree of predicted noise level exceedance above the Rating Background Level or Noise Management Level as appropriate
Certainty	Rating background levels, noise management levels or predicted noise impacts are not well understood
Past Experience	Nature of works are new, in a new location or have not been undertaken by the contractor on the project already
Negotiated Agreement with Sensitive Receivers	No negotiated agreement with sensitive receivers has been obtained in accordance with CoA E41
Exceeding residential ground-borne noise levels	Addressing potential evening and night-time exceedance levels of 40 and 35 dB (A) respectively
Potential Sleep Disturbance	Likely to generate potential sleep disturbance (Rating Background Level +15dB or greater)
Non-Residential Receivers	Impacted non-residential receivers operating during the same period of proposed OOH work
Special Events	The timing and location of special events in the area of the proposed OOH work may be scheduled at the same time or immediately before or after the special event (e.g. festivals, public gatherings, etc.)

Place Manager Feedback	Feedback from the Place Manager for the area will provide the AA and ER an understanding of the types and requirements of surrounding sensitive receivers.
Sensitive Receivers	Moderate impact sensitive receivers (e.g. standard residential, medium density receivers) or high impact sensitive receivers (e.g. residential home for the elderly, high density unit blocks, persistent complainers, residents deemed to have 'construction noise fatigue')
Timetabling noisy activities	Timetabling works with high noise levels to avoid sensitive times for receptors such as hospitals, community, religious, educational institutions and noise and vibration-sensitive businesses and critical working areas
High Impact Works	Prolonged high noise or vibration intensive activities
Other Impacts	Impacts other than noise and vibration impacts are likely to be generated (e.g. lighting, traffic, etc.)

4.3. Community Notifications

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

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

Community notification requirements are included in the CNVS and outlined in the Community Communications Strategy for the SM-WSA project.

Community notification is an example of an additional mitigation measure that may be considered for implementation in accordance with the CNVS and the additional mitigation measure tables contained in SM-21-00306108 Out-of-hours work application form.

4.3.1. Negotiated Agreements with Sensitive Receivers

A negotiated agreement for particular OOH work may be formed with the potentially affected sensitive receivers in accordance with CoA E41 (c) (iii). These negotiated agreements would be undertaken and documented by either the contractor or Sydney Metro as part of an OOH application.

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

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

4.4. Emergency Works

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

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

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

Figure 2 outlines the emergency work process.

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

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

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

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

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

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

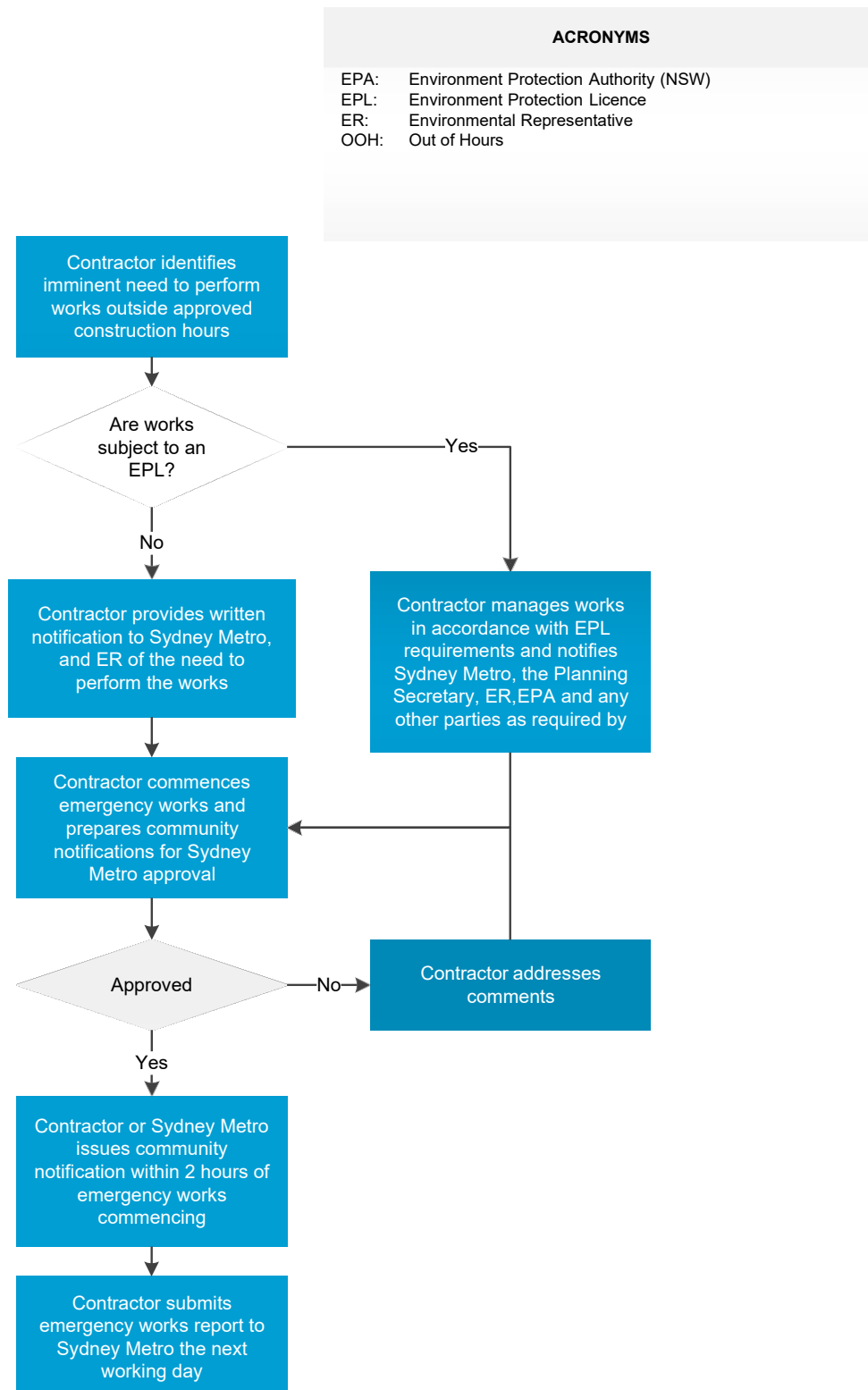


Figure 2: Emergency Works Process

4.5. Ground-borne noise level exceedance

4.5.1. Ground-borne regenerated noise condition

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).

4.5.2. Ground-borne regenerated noise condition assessment

The evening and night-time criteria are only applicable to residential receivers.

The internal noise levels are to be assessed at the centre of the most-affected habitable room. For a limited number of discrete, ongoing ground-borne noise events, such as drilling or rock-hammering, The LAmax noise descriptor using a slow response on the sound level meter may be better than the LAeq noise descriptor (15 min) in describing the noise impacts. The level of mitigation of ground-borne noise would depend on the extent of impacts and also on the scale and duration of works. Any restriction on the days when construction work is allowed would take into account whether the community:

- Has identified times of day when they are more sensitive to noise (for example Sundays or public holidays).
- Is prepared to accept a longer construction duration in exchange for days of respite.

4.5.3. Mitigation measures

Due to the highly variable nature of construction activities and the likelihood of work outside the standard construction hours on Sydney Metro projects, some exceedances of the construction noise and vibration management levels are likely to be unavoidable. Where there is a potential exceedance of the construction noise and vibration management levels, a number of additional measures to mitigate such exceedances – primarily aimed at pro-active engagement with affected sensitive receivers – would be explored and have been included in below. The additional mitigation measures to be applied are outlined in Table 3 below.

Table 3: Additional Mitigation Measures

Measure	Description	Abbreviation
Alternative accommodation	Alternative accommodation options may be provided for residents living in close proximity to construction works that are likely to incur unreasonably high impacts over an extended period of time. Alternative accommodation will be determined on a case-by-case basis.	AA
Monitoring	Where it has been identified that specific construction activities are likely to exceed the relevant noise or vibration goals, noise or vibration monitoring may be conducted at the affected receiver(s) or a nominated representative location (typically the nearest receiver where more than one receiver have been identified). Monitoring can be in the form of either unattended logging or operator attended surveys. The purpose of monitoring is to inform the relevant personnel when the noise or vibration goal has been exceeded so that additional management measures may be implemented.	M
Individual briefings	Individual briefings are used to inform stakeholders about the impacts of high noise activities and mitigation measures that will be implemented. Communications representatives from the contractor would visit identified stakeholders at	IB

(Uncontrolled when printed)

	least 48 hours ahead of potentially disturbing construction activities. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the project.	
Letter box drops	For each Sydney Metro project, a newsletter is produced and distributed to the local community via letterbox drop and the project mailing list. These newsletters provide an overview of current and upcoming works across the project and other topics of interest. The objective is to engage and inform and provide project-specific messages. Advanced warning of potential disruptions (e.g. traffic changes or noisy works) can assist in reducing the impact on the community. Content and newsletter length is determined on a project-by-project basis. Most projects distribute notifications on a monthly basis. Each newsletter is graphically designed within a branded template.	LB
Project specific respite offer	The purpose of a project specific respite offer is to provide residents subjected to lengthy periods of noise or vibration respite from an ongoing impact.	RO
Phone calls and emails	Phone calls and/or emails detailing relevant information would be made to identified/affected stakeholders within 7 days of proposed work. Phone calls and/or emails provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs etc.	PC
Specific notifications	Specific notifications would be letterbox dropped or hand distributed to identified stakeholders no later than 7 days ahead of construction activities that are likely to exceed the noise objectives. This form of communication is used to support periodic notifications, or to advertise unscheduled works.	SN

4.5.4. Applying additional mitigation measures

Prior to the commencement of OOHW a detailed noise impact assessment shall be carried out. Mitigation measures shall be determined based on potential exceedances of the relevant NML.

In circumstances where following application of the standard mitigation measures, the LAeq(15minute) construction noise and vibration levels are still predicted to exceed the Noise Management Level, including ground-borne noise levels, the relevant Additional Mitigation Measures (AMM) are considered to determine any offset strategies for these impacts (Tables 4-6).

The following steps need to be carried out to determine the Additional Mitigation Measures to be implemented:

- Determine the duration (time period) when the work is to be undertaken.
- Determine the level of exceedance above the NML.

From the AMM table, identify the additional mitigation measures to be implemented (abbreviation codes are explained in Table 3).

Table 4: Additional Mitigation Measures – Airborne Construction Noise

Mitigation Measures					
Time Period		Predicted LAeq (15minute) noise level Above NML			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard	Mon-Fri (7.00 am - 6.00 pm)	-	LB	LB, M, SN	LB, M, SN
	Sat (8.00 am - 1.00 pm)				
	Sun/Pub Hol (Nil)				
OOHW (Evening)	Mon-Fri (6.00 pm - 10.00 pm)	LB	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO
	Sat (1.00 pm - 10.00 pm)				
	Sun/Pub Hol (8.00 am - 6.00 pm)				
OOHW (Night)	Mon-Fri (10.00 pm - 7.00 am)	LB	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, AA
	Sat (10.00 pm - 8.00 am)				
	Sun/Pub Hol (6.00 pm - 7.00 am)				

Table 5: Additional Mitigation Measures – Ground Borne Construction Noise

Mitigation Measures				
Time Period		Predicted LAeq (15minute) noise level Above NML		
		0 to 10 dB	10 to 20 dB	> 20 dB
Standard	Mon-Fri (7.00 am - 6.00 pm)	No NML for GBN during standard hours, refer to Table 18		
	Sat (8.00 am - 1.00 pm)			
	Sun/Pub Hol (Nil)			
OOHW (Evening)	Mon-Fri (6.00 pm - 10.00 pm)	LB	LB, M, SN	LB, M, SN, IB, PC, RO
	Sat (1.00 pm - 10.00 pm)			
	Sun/Pub Hol (8.00 am - 6.00 pm)			
OOHW (Night)	Mon-Fri (10.00 pm - 7.00 am)	LB, M, SN	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, AA
	Sat (10.00 pm - 8.00 am)			
	Sun/Pub Hol (6.00 pm - 7.00 am)			

Table 6: Additional Mitigation Measures - Ground-borne Vibration

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

5. Related documents and references

Related documents and references

- [SM-17-00000022 Environment & Sustainability Management Manual](#)
- SM-21-00279320 Construction Environmental Management Framework
https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272116977_
- [SM-21-00279321 Construction Noise and Vibration Standard](#)
<https://icentral.tdocs.transport.nsw.gov.au/otcs/cs.exe/app/nodes/272123288>
- [SM-21-00306108 Out-of-hours Work Application Form](#)
- [Overarching Community Communications Strategy](#)
https://www.sydneymetro.info/sites/default/files/document-library/Sydney_Metro_Overarching_Community_Communication_Strategy.pdf
- [EPA Interim Construction Noise Guideline](#)

6. Superseded documents

Superseded documents

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

7. Document history

Version	Date of approval	Notes
1.0	14 October 2021	New document
2.0	8 November 2021	DPIE RFI Review

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

Out-of-hours work application form- SM-WSA

This form is to be used for formal review and approval of Out-of-hours (OOH) work as it may affect residential and non-residential receivers. This form can be used in accordance with the Sydney Metro - Western Sydney Airport out-of-hours works protocol. Each OOH application and all applicable appendices must be submitted to Sydney Metro as one PDF file at least 15 business days prior to the commencement of the proposed OOH work.

1. OOH Application	
Sydney Metro Project: Western Sydney Airport	
Contract:	
Contractor:	
Application Title: E.g. 'Smith St service relocation works'.	
Application Number: E.g. 1, 2, 3, etc.	
Application Date: Original submission date (resubmission date in parentheses if applicable).	
Relevant Planning Approval:	
Environment Protection Licence (EPL): If subject to an EPL, state title and number.	

2. Proposed OOH Work Details	
Description of works, including: - Work methodologies. - List of plant/equipment to be used (worst case scenario). - Location Map (and/or Environmental Control Map) attached as Appendix 1, indicating location of works, plant/equipment locations and receivers (including distance to nearest receiver for noisiest plant/equipment). - Traffic Management Plan and/or Traffic Control Plan if applicable as Appendix 2.	
Timing of works: Including proposed dates/times works are planned to be undertaken outside standard hours.*	
Worst-case number of consecutive occasions affecting the same receiver: Refer to Section 4 for definition of 'occasion'.	
Justification: Demonstrate how the proposed OOH work has been scheduled in accordance with the OOH work period prioritisation list.* Program acceleration is generally not accepted as a justification.	

* Unless specified otherwise in project-specific documentation, the prioritisation of work time periods is as follows:

- Standard Hours:** 7am to 6pm weekdays and 8am to 1pm Saturdays.
- Daytime OOH:** 1pm to 6pm Saturdays and 8am to 6pm Sundays and Public Holidays.
- Evening OOH:** 6pm to 10pm every day.
- Night Time OOH:** 10pm to 7am weekday mornings and 9pm to 8am weekend and Public Holiday mornings.

3. Assessed Noise and Vibration Impacts and Standard Mitigation Measures

Are the proposed works consistent with a prepared Construction Noise & Vibration Impact Statement (CNVIS)? (Y/N)	
If 'N', skip this section and move to Section 4.	
State the title of the CNVIS and attach the section(s) describing the noise and vibration impacts of the proposed works as Appendix 3.	
Quantitatively summarise the worst-case predicted noise and vibration impacts specific to the proposed OOH work for each OOH period on the nearest receivers and compare these against the respective management levels. For Night Time OOH Period works, include a review of potential sleep disturbance impacts in accordance with Section 4.3 of the ICNG.	Worst-case predicted noise impact summary: • • • Worst-case predicted vibration impact summary: • Potential sleep disturbance summary (for night time OOH periods only): •
Using Table 4 and Table 5, indicate in Table 6: • Which Additional Mitigation Measures (AMMs) are applicable for consideration, • Which of those applicable for consideration are planned to be implemented, • For AMMs that are applicable for consideration but not being implemented, justify why the AMM is not being implemented. • For AMMs that are being implemented, provide details on how the AMM is being implemented (e.g. which receivers being offered respite, alternative accommodation, etc.).	

4. Non-Assessed Noise and Vibration Impacts

Skip this section if Section 3 has been completed in full.

A quantitative noise assessment for OOH work is to be carried out in accordance with the *Interim Construction Noise Guideline* (DECC, 2009). This section allows applicants to address these requirements through the following steps:

- 1) Establishing Rating Background Levels (RBLs) and Noise Management Levels (NMLs).
- 2) Predicting the anticipated noise levels using a quantitative noise assessment:
 - a. Works that are not likely to generate high noise impacts for a significant duration may use a preliminary quantitative noise assessment (facilitated within this form). This ensures that all applications, as a minimum, include a preliminary quantitative noise assessment in accordance with the *Interim Construction Noise Guideline* (ICNG).
 - b. Works that are likely to generate high noise impacts for a significant duration may require a detailed quantitative noise assessment (e.g. Construction Noise and Vibration Impact Statement) to be undertaken.
 - c. Works that are likely to generate ground-borne or structure-borne vibration and/or noise require specialist advice and assessment.
- 3) Comparing predicted noise levels against RBLs/NMLs and applying standard mitigation measures as appropriate (i.e. implementing 'all feasible and reasonable' mitigation measures in accordance with the ICNG).
- 4) Considering additional mitigation measures when predicted noise levels exceed RBLs/NMLs.

The need for a detailed quantitative noise and vibration assessment will be considered by Sydney Metro, the contractor and the Environmental Representative (if applicable) collectively when the predicted noise levels are anticipated to:

- Exceed an RBL at a residential receiver or an NML at a non-residential receiver by more than 10dBA, **AND**
- Affect the same receiver on 10 or more consecutive occasions. An occasion is anytime works are carried out:
 - Between 6pm on a weekday and the start of standard hours the next day, **OR**
 - Between 1pm on a Saturday and 8am on a Sunday), **OR**
 - Between 8am on a Sunday or public holiday and the start of standard hours the next day.

A detailed quantitative noise and vibration assessment should generally include:

- Derivation of RBLs for residential receivers and/or derivation of NMLs for non-residential receivers based on noise monitoring at representative locations and local sensitivities.
- Detailed noise predictions for daytime, evening and night time OOH periods (as applicable) in accordance with Section 4.5 of the ICNG (including an outline of timing, duration and predicted noise levels for each OOH period).
- For Night Time OOH Period works, a review of potential sleep disturbance impacts in accordance with Section 4.3 of the ICNG.
- Detailed predictions of vibration levels for sensitive receivers.

Please complete the following Steps 1 to 4.

Step 1: RBLs/NMLs	If RBLs for residential receivers or NMLs for non-residential receivers have already been established (e.g. in an Environmental Impact Statement, Review of Environmental Factors, detailed quantitative noise assessment or Construction Noise and Vibration Impact Statement for other work activities), enter into Table 3 and attach the supporting evidence as Appendix 3. If no RBLs/NMLs have been established, use Table 1 to estimate and enter into Table 3.
Step 2: Predicted Anticipated Noise Levels	If predicted anticipated noise levels have already been established (e.g. in an Environmental Impact Statement, Review of Environmental Factors, detailed quantitative noise assessment), enter the predicted anticipated noise levels into Table 3 and attach the supporting evidence as Appendix 3. If predicted anticipated noise levels have not already been established, use Table 2 to estimate anticipated noise aspects for the noisiest plant/equipment and enter into Table 3. In Table 3, use these values to calculate the anticipated predicted noise levels.
Step 3: Exceedances and Mitigation Measures	Compare the anticipated predicted noise levels to the applicable RBLs/NMLs, calculate the exceedances and enter into Table 3. In Section 5, provide a description of the standard mitigation measures that are planned to be implemented in order to mitigate the noise impacts (and vibration impacts if relevant) as much as 'feasible and reasonable' in accordance with the ICNG.
Step 4: Consideration of Additional Mitigation Measures	Use Table 4 and the exceedances in Table 3 to determine the applicable Additional Mitigation Measures for consideration. Use Table 6 to indicate which of these measures are applicable for consideration, which will be implemented and provide justification/details accordingly.

5. Standard Mitigation Measures

Outline the standard noise mitigation measures that will be implemented during the proposed OOH work:

I.e. Implementation of all 'feasible and reasonable' mitigation measures in accordance with the ICNG):

-
-
-
-

Outline the standard vibration mitigation measures that will be implemented during the proposed OOH work:

I.e. Implementation of all 'feasible and reasonable' mitigation measures in accordance with the ICNG):

-

Table 1: Noise RBLs and NMLs

Skip this section RBLs and NMLs have already been established in other documentation.			
Sensitive Receiver Category	Estimated RBLs (dBA)		
Residential	Daytime OOH	Evening OOH	Night Time OOH
Urban (e.g. city hubs, near busy roads, near industrial activity)	55	50	45
Suburban	45	40	35
Quiet, rural or isolated	40	35	30
Non-Residential	ICNG NMLs (dBA)		
Industrial facilities	75 (only applicable when in use)		
Offices or retail	70 (only applicable when in use)		
Health and educational facilities	55 (only applicable when in use)		

Table 2: Predicted Noise Level Aspects

Skip this section if predicted noise levels have already been established in other documentation.		
Noise Aspect	Select the most applicable value for each noise aspect below and enter into Table 3.	dBA
1. Plant/Equipment Noise Level at 10m Including non-continuous use reduction (-5dBA) and annoying activity penalty (+5dBA) for as per ICNG (refer to ICNG Appendix B for predicted noise level data) <u>Underline indicates vibratory generating plant/equipment</u>	<u>Impact sheet piling rig</u>	100
	<u>Hand-held tamper</u> , excavator with hammer, rock-breaker, driven/vibratory piling, concrete saw, diamond saw, air track drill, large dozer, hand-held rail grinder	95
	<u>Jackhammer</u> , rock crusher, angle grinder, pneumatic hammer, medium dozer, tracked loader, impact wrench	90
	<u>Mainline tamper</u> , ballast regulator, dynamic track stabiliser, vibratory roller, mainline rail grinder, ballast train (pour/fill ballast), chainsaw, tub grinder/large mulcher, scraper, grader, super-sucker/vacuum truck, large backhoe/wheeled front-end loader, bored piling, pavement profiler, fixed crane, tracked excavator	85
	Small bulldozer, small excavator, tower crane, truck-mounted crane, forklift, bobcat, skid-steer front-end loader, road truck/truck and dog, dump truck, concrete truck/pump/mixer, compressor, non-vibratory/large pad foot roller, whacker packer/compactor, water cart, pavement laying machine, asphalt truck and sprayer, line marking truck, standard penetration testing, welder, pin puller	80
	Concrete vibrator, cherry-picker scissor lift/elevated work platform/Franna crane, small backhoe, front end loader, fence post driver, electric drill rig, hand held rattle gun, generator (diesel/petrol), spreader	75
	Lighting tower, medium-rigid truck/semi-trailer, welding equipment, small front end loader	70
2. Multiple Plant	Light vehicle, hand-tools (no impact), small cement mixer, attenuated generator (inside housing)	65
	More than one of the noisiest plant being used simultaneously at roughly the same location	+5

3. Local Screening	Existing screening between site and receiver (buildings, cuttings, canopies, etc.)	- 5
	Temporary screening to be implemented near work site	- 10
	Acoustic shed or enclosure	- 25
4. Distance Attenuation	< 10 metres	0
	10 to 20 metres	- 5
	20 to 35 metres	- 10
	35 to 60 metres	- 15
	60 to 100 metres	- 20
	100 to 180 metres	- 25
	180 to 350 metres	- 30
	350 to 1,000 metres	- 40

Table 3: Predicted Noise Levels and Exceedances of RBLs and/or NMLs (dBA)

Skip this section if Section 3 has been completed in full.										
Period (only complete as applicable for each period)	Noisiest Plant/Equipment (state the noisiest plant/equipment to be used during each applicable OOH period)	Receiver Type (state 'Res' or 'Non-Res' as applicable for closest receiver to noisiest plant/equipment)	Enter the most applicable values from Table 2, then add to determine the Predicted Noise Level				Predicted Noise Level (1 + 2 + 3 + 4)	NML (for Res)	NML (for Non-Res)	Exceedance (Predicted Noise Level minus NML for Res or Non-Res)
			1. Plant/Equipment Noise Level	2. Multiple Plant/Equipment	3. Local Screening	4. Distance Attenuation				
Daytime OOH *										
Evening OOH *										
Night Time OOH *										

* Refer to OOH period timings under Section 2 of this form.

Table 4: Additional Mitigation Measures (AMM) requiring Consideration for Implementation

OOH Period	AMMs that must be considered for implementation (apply the exceedances from Table 3 to the two OOH period categories below as applicable)			
	0 to 10 dBA Exceedance	>10 to 20 dBA Exceedance	>20 to 30 dBA Exceedance	>30 dBA Exceedance
Airborne Construction Noise				
Daytime OOH Period	–	LB	LB, M, SN	LB, M, SN
Evening OOH Period	LB	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO
Night Time OOH Periods	LB	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, AA
Ground Borne Construction Noise				

Daytime OOH Period	No NML for GBN during standard hours			
Evening OOH Period	LB	LB, M, SN	LB, M, SN, IB, PC, RO	LB, M, SN, IB, PC, RO
Night Time OOH Periods	LB, M, SN	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, AA

Table 5: List of Additional Mitigation Measures (AMM)

AMM Abbrev	AMM	AMM Descriptions and Guidance
LB	Letterbox-drop (generic to the project)	A newsletter is generally produced and distributed to the local community via letterbox-drop and the project mailing list. These newsletters provide an overview of current and upcoming works across the project and other topics of interest. The objective is to engage, inform and provide project-specific messages. The geographic extent of letterbox-drops is generally centred on the immediate surrounding community within 200 metres from the works site.
M	Monitoring	Where it has been identified that specific construction activities are likely to exceed the relevant Rating Background Levels (RBL) and/or Noise Management Levels (NMLs), monitoring may be conducted at the affected receiver(s) or a nominated representative location (typically the nearest receiver where more than one receiver have been identified). Monitoring can be in the form of either unattended logging or operator attended surveys. The purpose of monitoring is to inform the relevant personnel when the RBL/NML has been exceeded so that additional management measures may be implemented.
IB	Individual Briefings	Individual briefings are used to inform stakeholders about the impacts of high noise activities and mitigation measures that will be implemented. Communications representatives would visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the project.
PC	Phone calls (and/or emails)	Phone calls and/or emails (with specific notifications attached) detailing relevant information would be made to identified/affected stakeholders within seven days of proposed work. The objective of the phone calls and/or emails is to support letterbox-drop and specific notifications. Phone calls and/or emails provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs.
SN	Specific Notifications (specific to the OOH work)	Specific notifications are letterbox-dropped to identified stakeholders no later than 7 days prior to out of hour construction activities commencing that are likely to exceed the RBLs/NMLs. Specific notifications may be produced by Sydney Trains or by Sydney Metro (or on behalf of Sydney Metro by a contractor as approved by Sydney Metro): - Sydney Trains specific notifications cover all works being undertaken by various parties (including Sydney Metro) during designated rail possession periods. These specific notifications are delivered 14 days prior to works commencing and are delivered to all properties located within 250m of the proposed works. - Sydney Metro specific notifications focus on proposed Sydney Metro works being undertaken outside of designated rail possession periods and are only produced in the absence of any Sydney Trains notifications covering the proposed works. These notifications are delivered 7 days prior to works commencing and are delivered to all properties located within 100m of day works and within 200m of night works. All notifications are emailed to all registered stakeholders on site-specific email distribution lists.
RO	Respite Offer	The purpose of a project specific respite offer is to provide residents subjected to lengthy periods of noise and/or vibration impacts respite during OOH periods. Respite offers are offers made to affected receivers to provide a period of either no or limited noise impacts. This can be in the form of stopping or limiting works onsite or offering affected receivers dinner/movie vouchers. The first priority is to implement a period of no or limited noise impacts. If this cannot be achieved, dinner/movie vouchers may be offered on a case-by-case basis.

AA	Alternative Accommodation (<i>residential only</i>)	Alternative accommodation options may be provided for residents living in close proximity to construction works that are likely to incur unreasonably high impacts during night time OOH periods. Alternative accommodation will be considered on a case-by-case basis.
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Table 6: Consideration of Additional Mitigation Measures (AMM)

Additional Mitigation Measures	Applicable for Consideration? Y/N (refer to Table 4)	To be Implemented? Y/N	Justification/Details For AMMs that are applicable for consideration but not being implemented, justify why the AMM is not being implemented. For AMMs that are being implemented, provide details on how the AMM is being implemented (e.g. which receivers being offered RO, AA, etc.).
LB			
M			
IB			
PC			
SN			
RO *			
AA			

*If RO is being implemented, include how community consultation influenced the manner in which RO is being implemented.

6. Consideration Against Relevant Vibration Criteria

Using Table 2, indicate whether any vibratory plant/equipment is planned to be used for the proposed works (Y/N)

If 'N', skip this section and move to Section 7.

'People' Criterion	Are the proposed works anticipated to have any perceptible sleep disturbance impacts? (Y/N)
'Structures' Criterion	Are the proposed works anticipated to generate greater than 7.5mm/s vibration impacts on surrounding structures (generally within 25 metres of works)? (Y/N)
'Sensitive Equipment' Criterion	Are the proposed works anticipated to impact sensitive equipment located in surrounding non-residential receivers? (Y/N)

If 'Y' is answered to ANY of the above criteria AND the impacts affect the same receiver for more than one consecutive occasion (refer to Section 4 for 'occasion' definition), the need to prepare a detailed quantitative assessment will be considered collectively by Sydney Metro, the contractor and the Environmental Representative (if applicable).

7. Cumulative Impacts

Document the relevant details of any other OOH work (Sydney Metro or otherwise) that will impact the same receivers as those being impacted by these proposed works either concurrently or within 3 days of the start or end of these proposed works.

If other works have been identified in the row above, how have the proposed works been coordinated to ensure appropriate respite is provided?

8. Community Consultation

What community consultation has been undertaken already?

What community consultation is planned to be undertaken?

If drafted already, attach applicable Community Notification as Appendix 4.

9. Contractor's Signature

Contractor's Identification of Risk Level: If subject to Western Sydney Airport Sydney Metro planning approval and not subject to an EPL, provide Contractor's Identification of Risk Level (refer to the <i>Western Sydney Airport Sydney Metro Protocol</i> for guidance).	Circle: LOW or HIGH
Contractor's Signature:	
Name:	
Title:	
Contact Number:	
Date:	

10. Contractor's Contact Details

Contractor Personnel	Name	Mobile
Manager Environment:		
Manager Communications:		
Contractor's Representative:		
Contractor's 24hr contact person:		

Planning Approval Determination Page

	Step 1 – Endorsement from Sydney Metro Director Project Communications or Contractor's Communications Manager	Step 2 – Risk Identification/Endorsement from ER under the Planning Approval	Step 3 – If works are under Sydney Trains EPL, approval from Sydney Metro Director of Planning, Environment and Sustainability. If works are not under an EPL, approval from either the ER or the Secretary of the NSW Department of Planning & Environment
Risk Level:	N/A	<i>If not subject to an EPL, circle Risk Level as: LOW or HIGH</i> <i>If works are HIGH Risk Level Sydney Metro submits application to the Secretary of the NSW Department of Planning & Environment for approval.</i>	N/A
Signature:	<i>Approved Road Occupancy Licence/Road Opening Permit (if applicable) must be sighted prior to endorsement.</i>		
Name:			
Role:			
Date:			
Comments: (including ER Risk Level comments if applicable)			
Conditions:			

Generic Determination Page (i.e. not subject to SM-WSA planning approvals)

	Step 1 – Sydney Metro Director of Project Communications	Step 2 – Environmental Representative (may be optional depending on planning approval or contract requirements)	Step 3 – Sydney Metro Director of Planning, Environment & Sustainability (only required if not approved already)
Action:	Endorsement	Circle: Endorsement or Approval	Approval
Signature:	<i>Approved Road Occupancy Licence/Road Opening Permit (if applicable) must be sighted prior to endorsement.</i>		
Name:			
Date:			
Comments:			
Conditions:			

Appendix 1: Location Map (and/or Environmental Control Map)

Appendix 2: Traffic Management Plan and/or Traffic Control Plan

(if applicable)

Appendix 3: Supporting Evidence for Noise & Vibration Impacts (e.g. Construction Noise & Vibration Impact Statement, noise assessment, etc.)

(if applicable)

Appendix 4: Community Notification

(if applicable and already drafted)

Appendix 1: Location Map (and/or Environmental Control Map)

Appendix 2: Traffic Management Plan and/or Traffic Control Plan

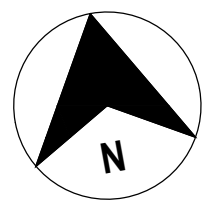
(if applicable)

Appendix 3: Supporting Evidence for Noise & Vibration Impacts (e.g. Construction Noise & Vibration Impact Statement, noise assessment, etc.) (if applicable)

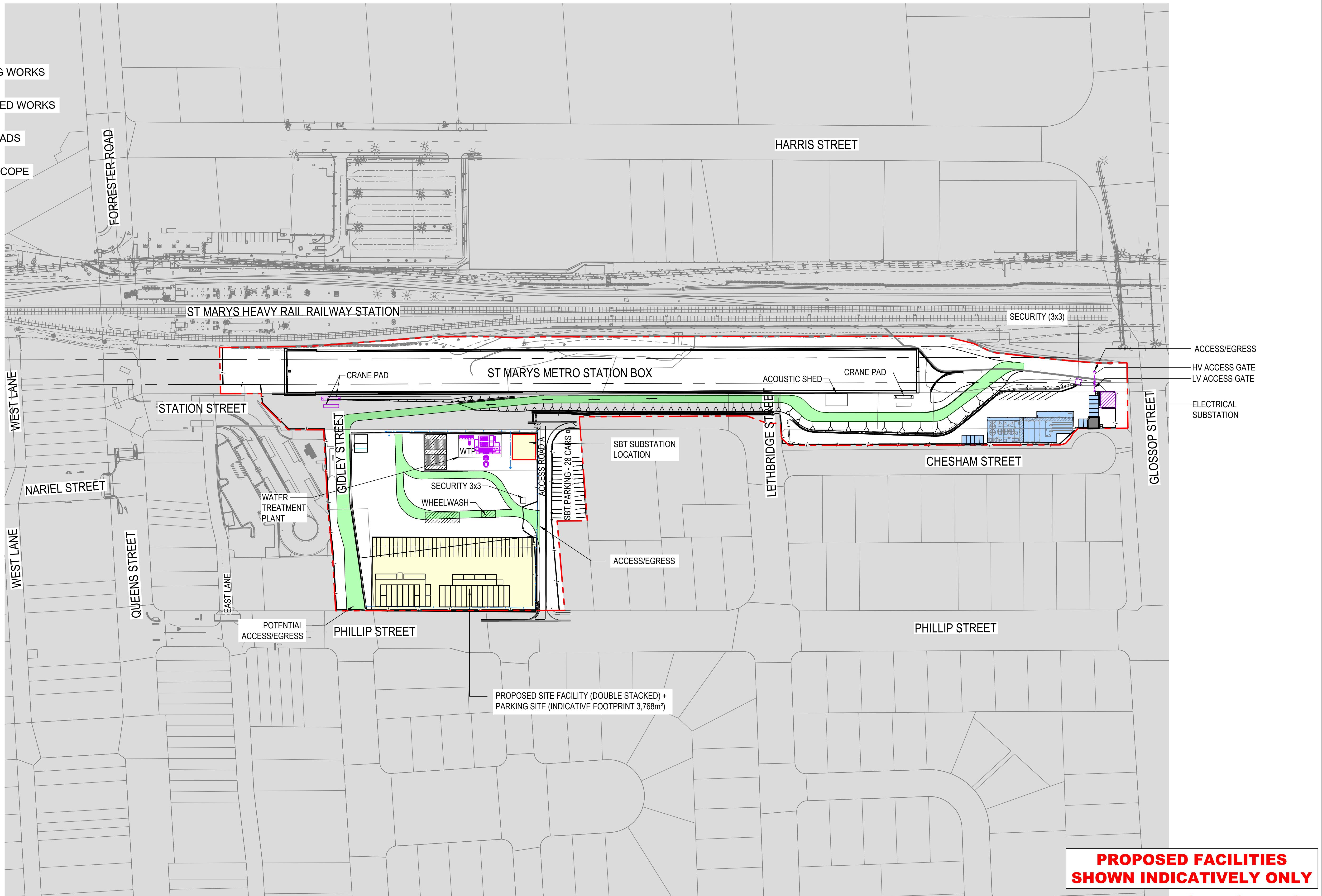
Appendix 4: Community Notification

(if applicable and already drafted)

Appendix E Indicative Construction Site Layouts



- EXISTING WORKS
- PROPOSED WORKS
- MAIN ROADS
- NOT IN SCOPE



**PROPOSED FACILITIES
SHOWN INDICATIVELY ONLY
FOR INFORMATION**

SCALE: 1:1000				
REV.	AMENDMENT DESCRIPTION	Design by	Verified by	Approved by
A1	Co-ordinate System:	Height Datum:	This sheet may be prepared using colour and may be incomplete if copied	

NOTE: Do not scale from this drawing.

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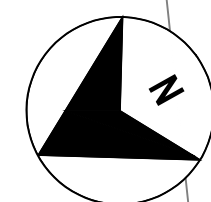
NSW GOVERNMENT

sydney METRO

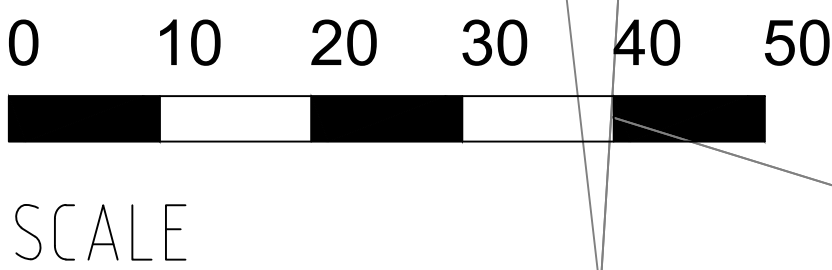
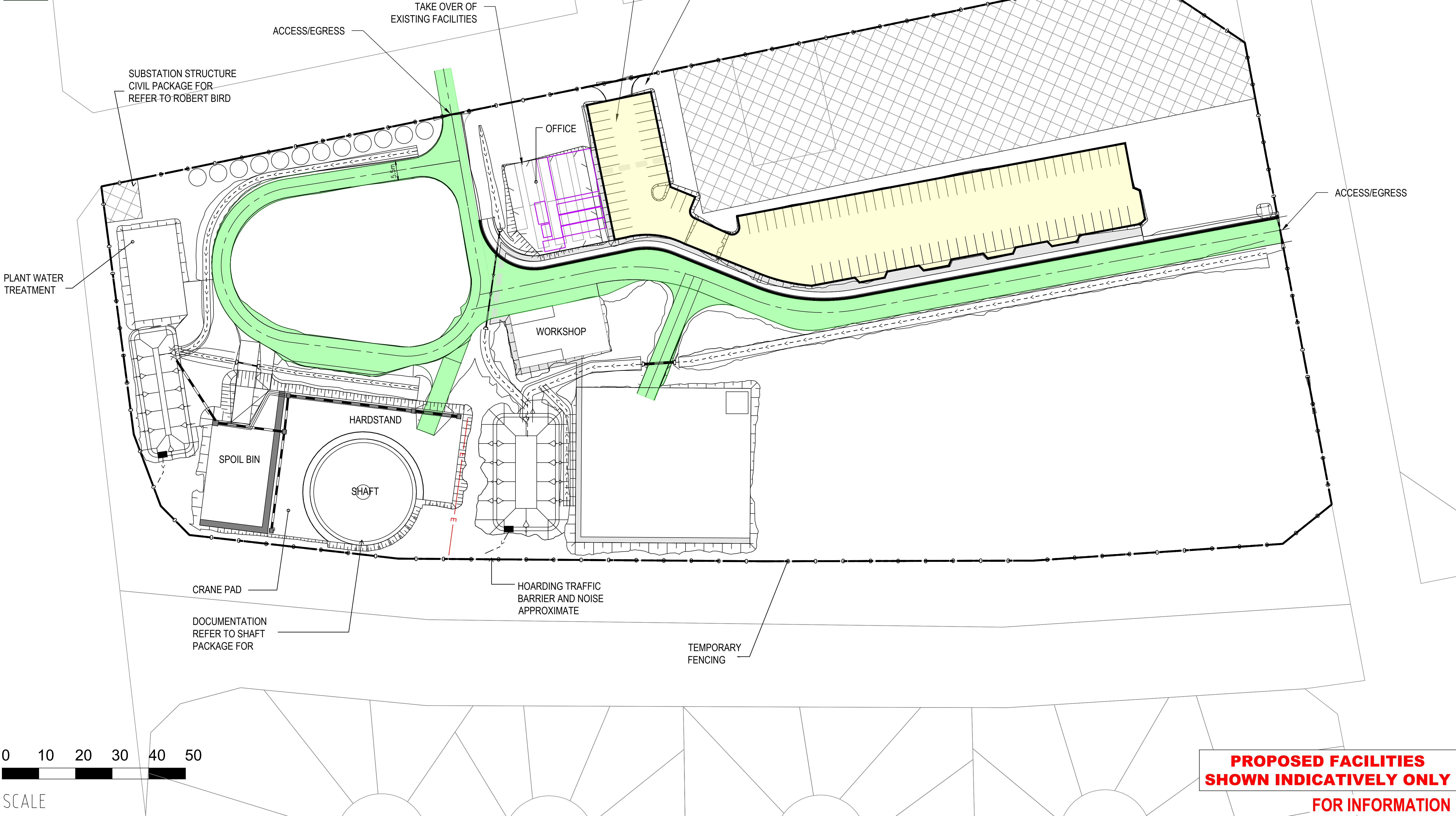
Parklife Metro D&C

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TAO DESIGN COMPANY/CONTRACTOR:	
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DRG CHECK	-----
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APPROVED	-----

SYDNEY METRO - WSA - SSTOM			
ST MARYS			
SITE ESTABLISHMENT PLAN			
STAGE 1: INITIAL HANDOVER 28/09/2023			
VERSION: 2			
FILE No:	SHEET: OF		©
STATUS:	EDMS No:		
DRG No: SMWSASSM-PLD-STM-MB-M2D-STG1V2	REV	VER	



- PROPOSED WORKS
- MAIN ROADS



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WORK IN PROGRESS

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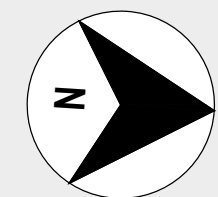
CLIENT:

NSW GOVERNMENT | sydney METRO

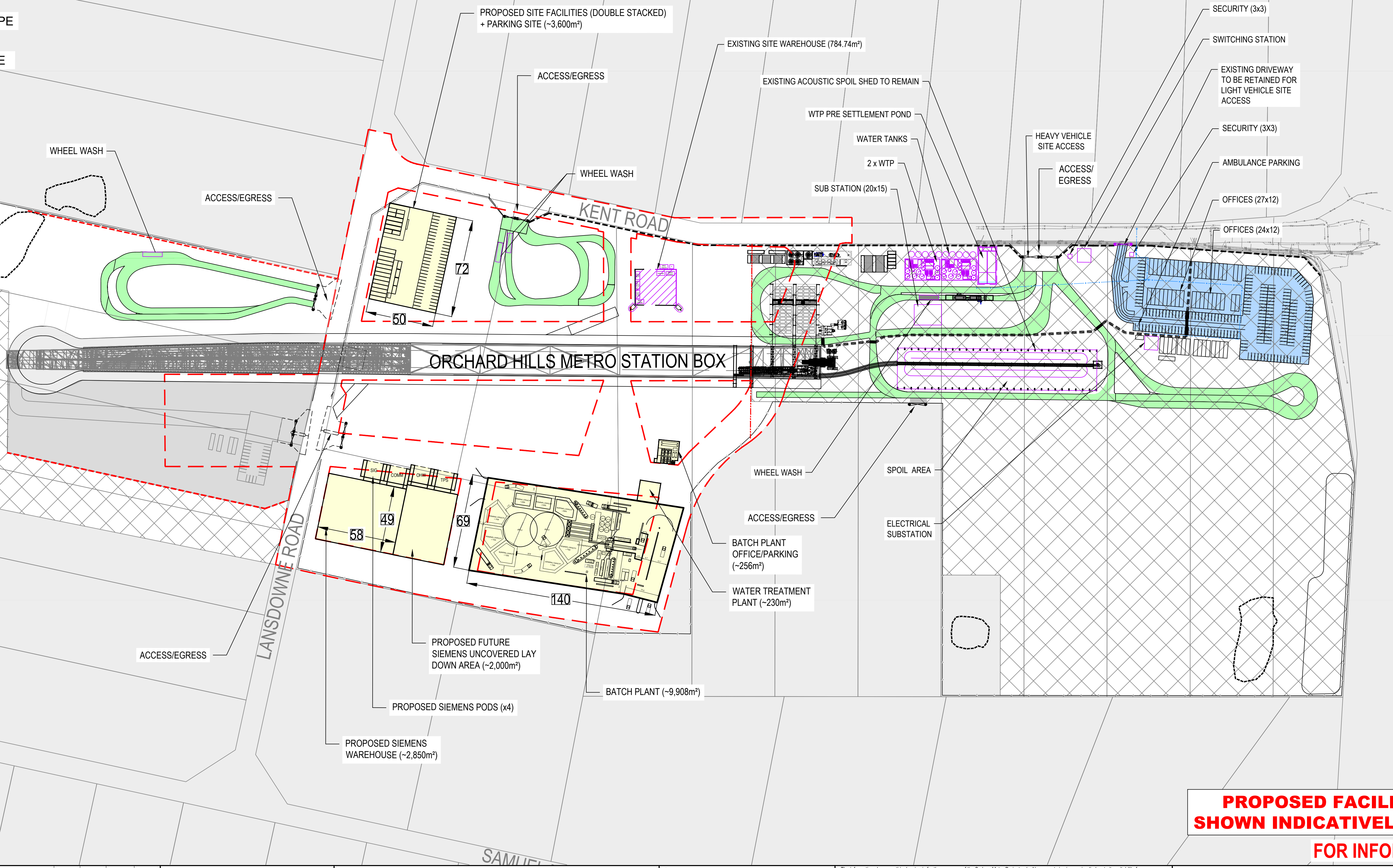
Parklife Metro D&C

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SYDNEY METRO - WSA - SSTOM			
CLAREMONT MEADOWS			
SITE ESTABLISHMENT PLAN			
INITIAL HANDOVER 15/11/2024			
VERSION:			
FILE No:	SHEET:	OF	©
STATUS:	EDMS No:	REV	VER
DRG No: SMWSASSM-PLD-CMF-MB-M2D-0001V1			



- EXISTING WORKS
- PROPOSED WORKS
- MAIN ROADS
- FUTURE SCOPE
- NOT IN SCOPE



**PROPOSED FACILITIES
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REV.	AMENDMENT DESCRIPTION	Design by	Verified by	Approved by	Date
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WORK IN PROGRESS

CLIENT:

NSW GOVERNMENT

sydney METRO

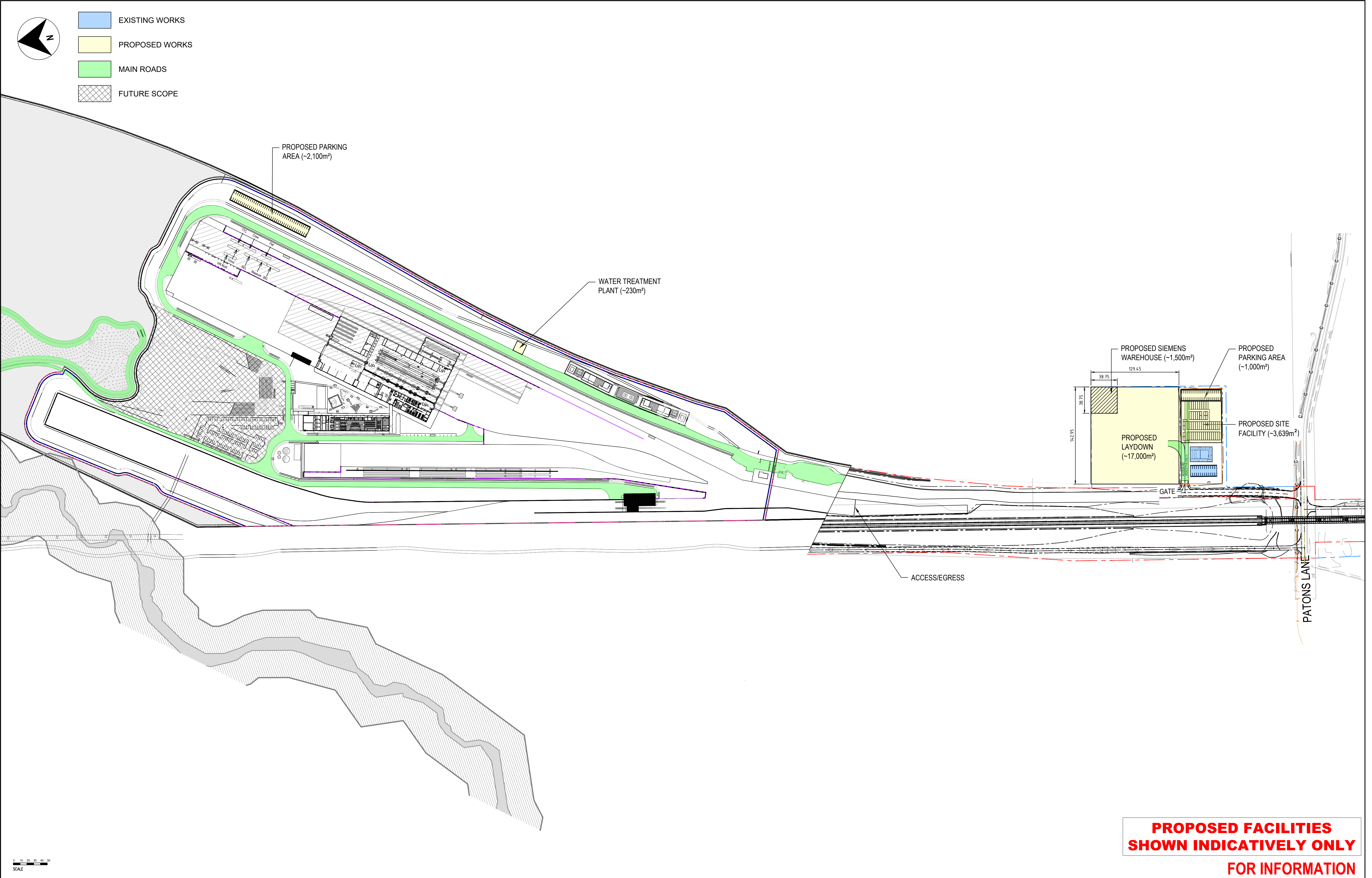
Parklife Metro D&C

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SYDNEY METRO - WSA - SSTOM			
ORCHARD HILLS			
SITE ESTABLISHMENT PLAN			
STAGE: 1 INITIAL HANDOVER 11/08/2023			
VERSION: 2			
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DRG No: SMWSASSM-PLD-OHE-MB-M2D-STG1V2			



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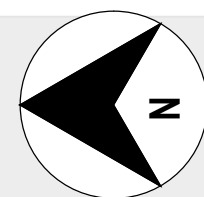
CLIENT:

NSW GOVERNMENT | sydney METRO

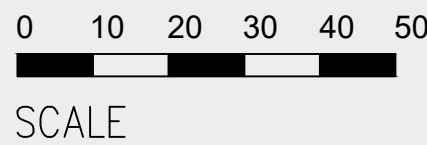
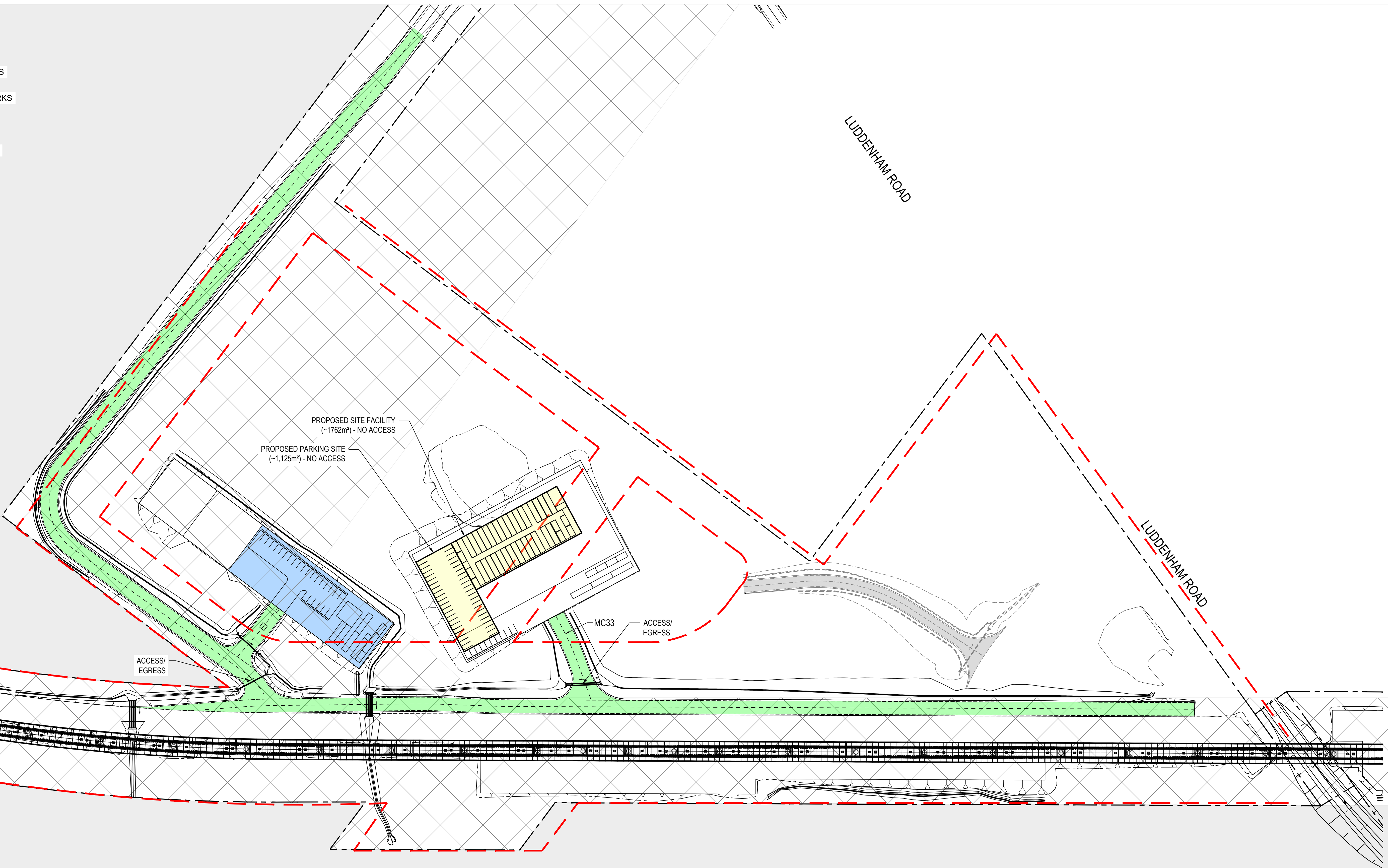
Parklife Metro D&C

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DRG CHECK	-----
DESIGN CHECK	-----
APPROVED	-----

SYDNEY METRO - WSA - SSTOM			
SITE MAINTENANCE FACILITY			
SITE ESTABLISHMENT PLAN			
STAGE: 1 INITIAL HANDOVER 08/08/2023			
VERSION: 2			
FILE No:	SHEET: OF	©	
STATUS:	EDMS No:	REV	VER
DRG No: SMWSASSM-PLD-SMF-MB-M2D-STG1V2			



- EXISTING WORKS
- PROPOSED WORKS
- MAIN ROADS
- FUTURE WORKS
- NOT IN SCOPE



**PROPOSED FACILITIES
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FOR INFORMATION

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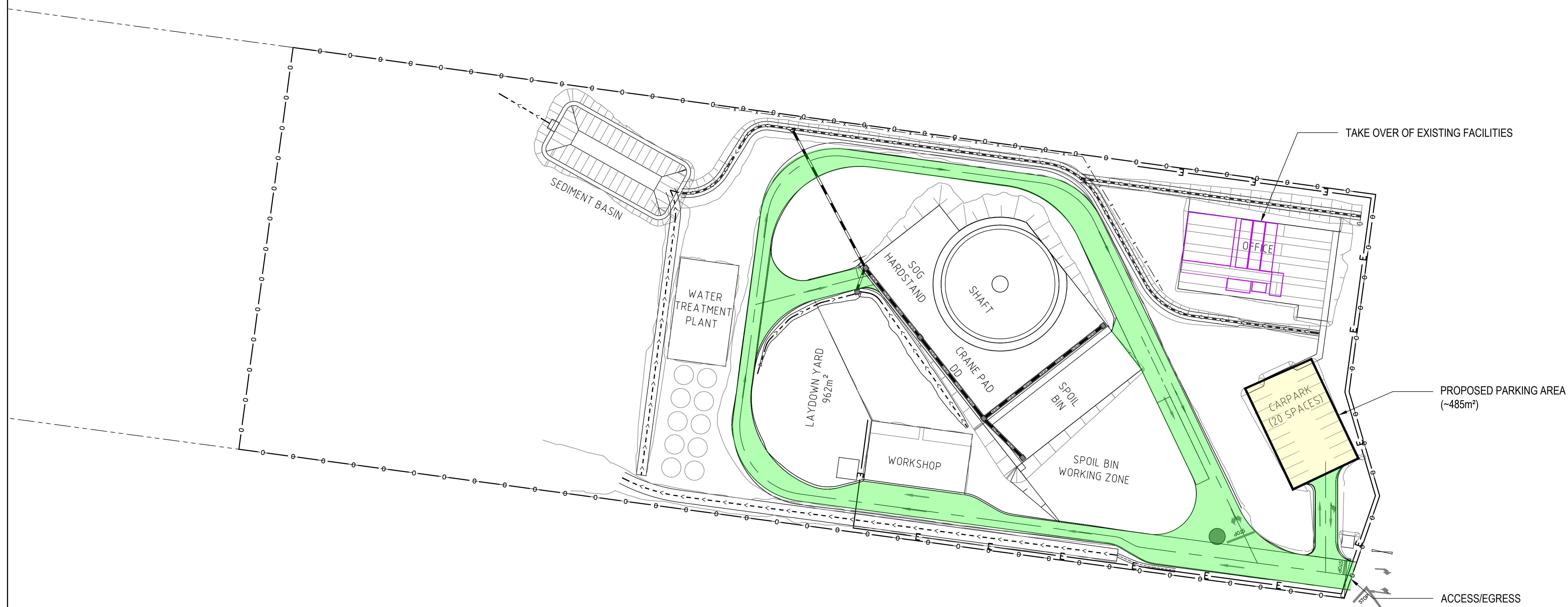
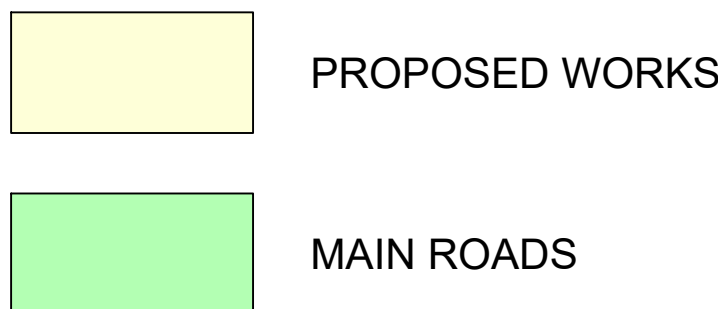
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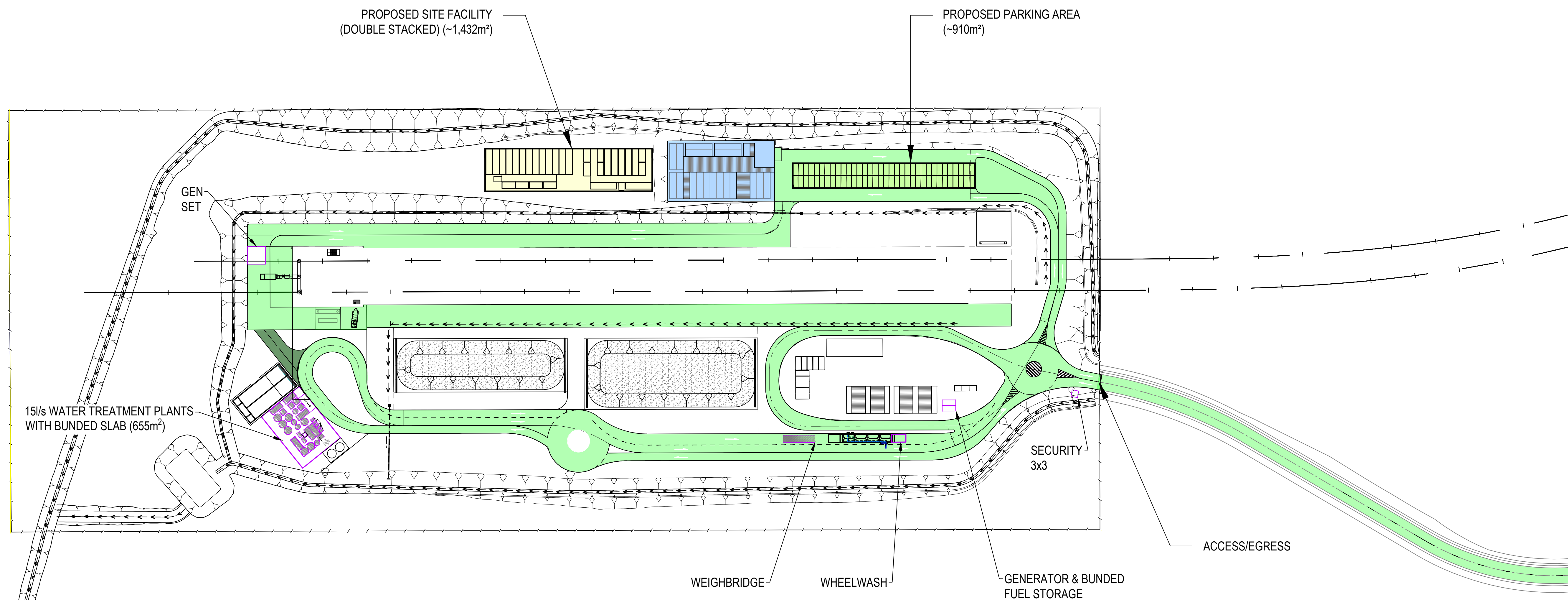
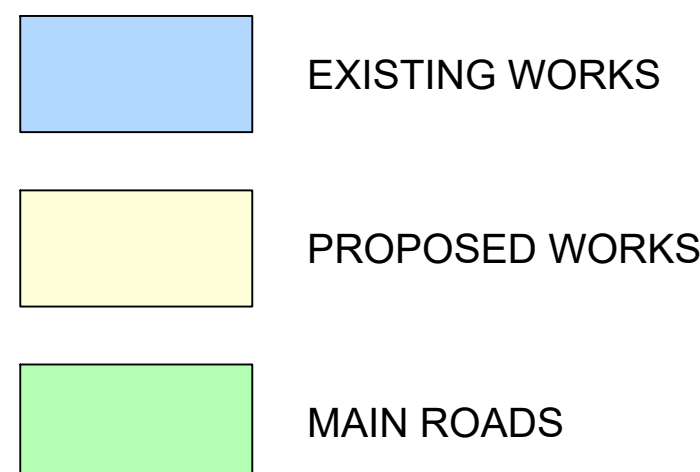
SYDNEY METRO - WSA - SSTOM			
LUDDENHAM STATION			
SITE ESTABLISHMENT PLAN			
STAGE: 1 INITIAL HANDOVER 02/10/2023			
VERSION: 2			
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STATUS:	EDMS No:	REV	VER
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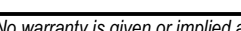
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FOR INFORMATION**

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REV.	AMENDMENT DESCRIPTION				Design by	Verified by	Approved by	Date						
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REV.	AMENDMENT DESCRIPTION				Design by	Verified by	Approved by	Date		
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Appendix F Records of Consultation

Consultation Summary

Document Reference	Stakeholder	Comment	Parklife Metro D&C Response
N/A	Penrith City Council	There appears to be a formatting error with Table 24, and as such comment has not been provided in relation to the context found within the table.	Noted. Formatting has been fixed.
N/A	Penrith City Council	The proposed sub plan and monitoring program is generally satisfactory, provided that the recommendations and mitigation measures are adhered to and implemented where applicable	Noted.
N/A	Penrith City Council	The Noise and Vibration Monitoring Program details the baseline data retrieved over a satisfactory monitoring period for reference during baseline monitoring, as well as the parameters of the project to be monitored and frequency of ongoing monitoring in comparison to correctly nominated noise criteria. Whilst there has been brief discussion provided in relation to the locations of which acoustic monitoring is to be undertaken, specific locations have not yet been determined. It is recommended that the Noise and Vibration Monitoring Program document be amended once applicable to include figures which identify the determined monitoring locations in relation to surrounding sensitive receivers and detailing what particular works are being undertaken to trigger the monitoring.	In accordance with Section 5.1.5 of the Monitoring Program, details of specific monitoring locations would be confirmed in DNVIS', which will be prepared in accordance with E47. In addition, Section 5.1.5 of the NV Mon. Prog. has been updated with indicative noise monitoring locations at noise sensitive locations (St Marys and Orchard Hills)
N/A	Penrith City Council	It is noted that Appendix C of the Noise and Vibration Management Sub-Plan contains a preliminary Land Use Survey, however the Survey is not dated, and it is supported that as has been stated, a further detailed land use survey is to be prepared and implemented into amended documentation as the construction phase continues to ensure that surrounding sensitive receivers are correctly identified and mitigation measures can be appropriately provided.	Detailed land use surveys will be undertaken in accordance with Condition E37.
WaterNSW Guideline for Development	WaterNSW	Please note that a more current version of the WaterNSW Guideline is available for design and construction purposes (WaterNSW, September 2021). We acknowledge that the subplan references the specific CoA (E121) and therefore has the guideline version applicable to that period in time. WaterNSW requests that the most current version of the Guideline be utilised (see below link) as guidance. https://www.watarnsw.com.au/__data/assets/pdf_file/0011/55973/Guideline-fordevelopment-adjacent-to-the-Upper-Canal-and-Warragamba-Pipelines-2021.pdf	Section 6.4.3 has been updated to provide reference to the latest version of the guideline, which will be used to guide the construction and operational agreements with WaterNSW.

Document Reference	Stakeholder	Comment	Parklife Metro D&C Response
Section 3.2 Project Requirements	WaterNSW	Item 3.4g(iii) of this table is missing the location of where that item is addressed. It says '0', however it should be Appendix A.	Reference corrected.
Section 6.4.2 High vibration levels over shorter periods	WaterNSW	WaterNSW does not look favorably on allowing higher vibration levels over shorter periods. WaterNSW request that this section be amended or that WaterNSW's position be noted and in the separate assessment and plan of management for construction works adjacent to the pipelines, that high vibration levels over shorter periods not be allowed.	Section 6.4.2 has been revised to clarify that the higher vibration levels over shorter periods is in reference to human comfort impacts and not to impacts on building or structures.
6.4.3 Vibration sensitive structures	WaterNSW	WaterNSW acknowledges that the criteria for vibration limits is discussed in section 6.4.3 of the sub-plan for heritage items and buried pipework. As per our 'Guideline for Development', we reiterate that the peak particle velocity (PPV) measured in mm/s be in accordance with line 3 of table 1 of German Standard DIN 4150-2016 for works adjacent to the Warragamba Pipelines. The sub-plan also states that '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 18 – Guideline values for vibration velocity criteria on buried pipework. Table 18 references buried pipework and as such does not apply to the Warragamba Pipelines. The document should be amended to state that this table or requirement does not relate to the Warragamba Pipelines.	Table 1 of German Standard DIN 4150-2016 has been added Section 6.4.3 and text added to link line 3 of this table to the vibration limits associated with the Warragamba to Prospect Water Supply Pipelines.
Section 7.2.5 Heritage Receivers and Vibration	WaterNSW	WaterNSW supports the commitment to undertake a specific assessment of potential vibration impacts to the Warragamba Pipelines (in accordance with RMM NV2). It should be noted that the heritage significance is not the only factor important to structure protection. The criticality of the infrastructure and its construction is a major consideration when determining vibration impact.	Additional text has been added to Section 7.2.5 to comment on the criticality of the infrastructure.
Appendix B – Noise and Vibration Monitoring Program	WaterNSW	With regards to vibration and settlement monitoring, WaterNSW does not allow any monitoring equipment to be permanently affixed to its assets, spray marking paint on assets or any changes to assets (i.e. drilling holes to affix monitoring devices). Adequate consideration is required by a qualified expert to detail how the monitoring devices will be placed. It is suggested that further advice be included within Appendix B (section 5.2.3) on vibration monitoring equipment and methods.	Section 5.2.1 of Appendix B has been revised to state these requirements. Any vibration monitoring will be detailed in the DNVIS required under REMM NV2, which will be prepared by a qualified expert and will include details of the vibration monitoring equipment and methods.

Document Reference	Stakeholder	Comment	Parklife Metro D&C Response
N/A	Liverpool City Council	The Environmental Impact Statement for the Project confirms that operation of the Project would be a scheduled activity under Schedule 1 of the Protection of the Environment Operations (POEO) Act 1997. 'Railway activities-railway infrastructure construction' and 'Railway activities-railway infrastructure operation' are identified in Schedule 1 of the Protection of the Environment Operations Act 1997 as scheduled activities requiring an Environment Protection Licence. It is therefore expected that the Project will be constructed and operated in accordance with the requirements of the POEO Act 1997 and any relevant Environment Protection Licence issued by the NSW EPA. Consequently, it is understood that the NSW EPA would be the Appropriate Regulatory Authority (ARA) for the proposed construction and operation of the Project. Although not specified in Condition C5 of the Project Approval, it is requested that the NSW EPA is also consulted in relation to soil and water management and noise and vibration matters including preparation of the individual sub-plans for the Project.	Parklife Metro D&C have ongoing consultation with the NSW EPA regarding licencing and consultation will continue during construction. The SSTOM Works will have an EPL applicable to construction, which is discussed in Section 3.4 of the NVMP. Application for an operational EPL will occur prior to that phase of the works, in consultation with the NSW EPA.
N/A	Liverpool City Council	Independent audits are required of the Project in accordance with Condition A36 of SSI 10051 and the Department's 2020 Independent Audits Post Approval Requirements (or IAPAR). In this case, it is requested that the submitted documentation is audited as it relates to post-approval requirements and compliance for the Project. The required audit scope is outlined in Section 3.3 of the IAPAR and necessitates an assessment of all conditions of consent applicable to the phase of the development. It is requested that the auditor assesses conformance with all post approval and compliance documents prepared to satisfy the conditions of consent, including an assessment of the Construction Environmental Management Plan and sub-plans. Consistent with Section 3.3 of the IAPAR, the auditor must review the environmental performance of the development with consideration for the Environmental Impact Statement and assess the adequacy of the Environmental Management Plans and sub-plans (Conditions C1 to C12). In particular, the auditor must focus on the construction noise and vibration and soil and water CEMP sub-plans and any other relevant monitoring requirements imposed by the Applicant's Environmental Management System. In addition to the above requirements, it is requested that the auditor ascertains whether the Applicant has addressed the key issue conditions relating to noise and vibration (Conditions E37 to E60); and water (Conditions E126 to E134). The auditor must also consider any other matters raised by the Department, regulatory requirements, Project performance and industry best practice.	The independent audits will be undertaken for the project in accordance with Condition A36. The audits are described in Section 3.9.4 of the CEMP, and are the responsibility of Sydney Metro.

Document Reference	Stakeholder	Comment	Parklife Metro D&C Response
N/A	Liverpool City Council	To improve environmental health outcomes and efficiency during the development assessment process, Council requires development applications to be supported by technical reports prepared or reviewed and certified by suitably qualified and industry certified environmental consultants. In this regard, Council requires acoustic reports to be prepared or reviewed and certified by a suitably qualified acoustic consultant who is a member of the Australian Acoustical Society or employed by an Association of Australasian Acoustical Consultants (AAAC) member firm. In accordance with Council's requirements, general environmental reports are required to be prepared or reviewed and certified by a suitably qualified environmental consultant who is certified under the Environment Institute of Australia and New Zealand- Certified Environmental Practitioner (CEnvP) scheme. It is recommended that the Department adopts a similar approach during their assessment of the Application. Further information is available on Council's website at https://www.liverpool.nsw.gov.au/development/development-and-building	The CEMF, CNVS, CTMF, REMMs and the Infrastructure Approval identify where technical experts are required to prepare document or provide review and/or endorsement. Parklife Metro D&C acknowledge Liverpool City Councils comment and will ensure documents are prepared, reviewed and/or endorsed by expert practitioners, as applicable.

1 Penrith City Council

REVIEW COMMENTS SHEET

DOCUMENT NO.	TITLE	VER	STATUS	NO.	DATE	COMPANY	RAISED BY	REVIEW DOC. NO.*	DOCUMENT REF*	DEED REF*	COMMENTS / RESPONSE	COMMENT CATEGORY*	CLOSED OUT
SMWSASSM-PLD-1NL-PC-PLN-000024	Sydney Metro - WSA - SSTOM - Noise and Vibration Management Plan	B.01	S3	04	24/04/2023	PCC	LVALLEJO	SMWSASSM-PLD-1NL-PC-PLN-000024	General	NA	There appears to be a formatting error with Table 24, and as such comment has not been provided in relation to the context found within the table.	Observation	N
				05	24/04/2023	PCC	LVALLEJO	SMWSASSM-PLD-1NL-PC-PLN-000024	General	NA	The proposed sub plan and monitoring program is generally satisfactory, provided that the recommendations and mitigation measures are adhered to and implemented where applicable.	Observation	N
				06	24/04/2023	PCC	LVALLEJO	SMWSASSM-PLD-1NL-PC-PLN-000024	General	NA	The Noise and Vibration Monitoring Program details the baseline data retrieved over a satisfactory monitoring period for reference during baseline modelling, as well as the parameters of the project to be monitored and frequency of ongoing monitoring in comparison to correctly nominated noise criteria. Whilst there has been brief discussion provided in relation to the locations of which acoustic monitoring is to be undertaken, specific locations have not yet been determined. It is recommended that the Noise and Vibration Monitoring Program document be amended once applicable to include figures which identify the determined monitoring locations in relation to surrounding sensitive receivers and detailing what particular works are being undertaken to trigger the monitoring.	Observation	N
				07	24/04/2023	PCC	LVALLEJO	SMWSASSM-PLD-1NL-PC-PLN-000024	General	NA	It is noted that Appendix C of the Noise and Vibration Management Sub-Plan contains a preliminary Land Use Survey, however the Survey is not dated, and it is supported that as has been stated, a further detailed land use survey is to be prepared and implemented into amended documentation as the construction phase continues to ensure that surrounding sensitive receivers are correctly identified and mitigation measures can be appropriately provided.	Observation	N

2 Liverpool City Council

From: Mark Chilton
To: Colin Kennedy
Cc: Jenny Bradford
Subject: FW: Liverpool Council Response RE: SMWSA Project - SSTOM Works Environmental Management Plans for review
Date: Monday, 26 June 2023 10:00:34 AM
Attachments: image008.png
image009.png

From: Peter Nelson <NelsonP@liverpool.nsw.gov.au>
Sent: Monday, June 26, 2023 9:40 AM
To: Mark Chilton <mark.chilton@parklifejv.au>
Subject: Liverpool Council Response RE: SMWSA Project - SSTOM Works Environmental Management Plans for review

Mark,

Many apologies for not replying to your e-mail requests in a timely manner.

Council has reviewed the e-mails you indicated were sent through for comment on 13th March, 29th March, 5th April. Council have received the following documents:

13 March – Document provided: “Non-Aboriginal Heritage Management Sub-plan SMWSASSM-PLD-1NL-PC-PLN-000026 (Rev B)”
27 March – Document Provided: “Non-Aboriginal Heritage Management Sub-plan SMWSASSM-PLD-1NL-PC-PLN-000026 (Rev B)”
30 March – Documents Provided: “Sydney Metro - WSA - SSTOM - Noise and Vibration Management Plan SMWSASSM-PLD-1NL-PC-PLN-000024 (Rev B)”
“Sydney Metro WSA - SSTOM - Soil and Water Management Plan SMWSASSM-PLD-1NL-PC-PLN-000020 (Rev B)”

Following internal referral to Council's relevant subject matter experts, the following advice is provided:

Heritage

1. Prior to commencement of works, a dilapidation report should be prepared for Kelvin Park House.
2. During works, vibration monitoring should be undertaken at Kevlin Park House during excavation and tunnelling works.
3. On completion, a post works dilapidation report should be undertaken and any changes assessed and repaired where required.

Environmental Health

It is noted that the Minister for Planning and Public Spaces granted approval for the critical State Significant Infrastructure (CSSI) project on 14th April 2022 subject to conditions of consent. Condition C5, Part C of the Project Approval requires the Construction Environmental Management Plan (CEMP) noise and vibration sub-plan and soil and water sub plan to be prepared in consultation with Council.

In accordance with the Project Approval, CEMP Sub-plans, except for any subplans expressly nominated by the Planning Secretary, must be endorsed by the Environmental Representative only. Council was recently provided with the opportunity to provide feedback regarding the following documentation for the Project:

- Soil and Water Management Sub-Plan SMWSASSM-PLD-1NL-PC-PLN-000020 (Rev B) prepared by Parklife Metro D & C dated 27th March 2023; and
- Noise and Vibration Management Sub-Plan SMWSASSM-PLD-1NL-PC-PLN-000024 (Rev B) prepared by Parklife Metro D & C dated 27th March 2023

The Environmental Impact Statement for the Project confirms that operation of the Project would be a scheduled activity under Schedule 1 of the *Protection of the Environment Operations (POEO) Act 1997*. 'Railway activities-railway infrastructure construction' and 'Railway activities-railway infrastructure operation' are identified in Schedule 1 of the *Protection of the Environment Operations Act 1997* as scheduled activities requiring an Environment Protection Licence.

It is therefore expected that the Project will be constructed and operated in accordance with the requirements of the *POEO Act 1997* and any relevant Environment Protection Licence issued by the NSW EPA. Consequently, it is understood that the NSW EPA would be the Appropriate Regulatory Authority (ARA) for the proposed construction and operation of the Project. Although not specified in Condition C5 of the Project Approval, it is requested that the NSW EPA is also consulted in relation to soil and water management and noise and vibration matters including preparation of the individual sub-plans for the Project.

Independent audits are required of the Project in accordance with Condition A36 of SSI 10051 and the Department's 2020 *Independent Audits Post Approval Requirements* (or IAPAR). In this case, it is requested that the submitted documentation is audited as it relates to post-approval requirements and compliance for the Project.

The required audit scope is outlined in Section 3.3 of the IAPAR and necessitates an assessment of all conditions of consent applicable to the phase of the development. It is requested that the auditor assesses conformance with all post approval and compliance documents prepared to satisfy the conditions of consent, including an assessment of the Construction Environmental Management Plan and sub-plans.

Consistent with Section 3.3 of the IAPAR, the auditor must review the environmental performance of the development with consideration for the Environmental Impact Statement and assess the adequacy of the Environmental Management Plans and sub-plans (Conditions C1 to C12). In particular, the auditor must focus on the construction noise and vibration and soil and water CEMP sub-plans and any other relevant monitoring requirements imposed by the Applicant's Environmental Management System. In addition to the above requirements, it is requested that the auditor ascertains whether the Applicant has addressed the key issue conditions relating to noise and vibration (Conditions E37 to E60); and water (Conditions E126 to E134). The auditor must also consider any other matters raised by the Department, regulatory requirements, Project performance and industry best practice.

To improve environmental health outcomes and efficiency during the development assessment process, Council requires development applications to be supported by technical reports prepared or reviewed and certified by suitably qualified and industry certified environmental consultants. In this regard, Council requires acoustic reports to be prepared or reviewed and certified by a suitably qualified acoustic consultant who is a member of the Australian Acoustical Society or employed by an Association of Australasian Acoustical Consultants (AAAC) member firm.

In accordance with Council's requirements, general environmental reports are required to be prepared or reviewed and certified by a suitably qualified environmental consultant who is certified under the Environment Institute of Australia and New Zealand- Certified Environmental Practitioner (CEnvP) scheme. It is recommended that the Department adopts a similar approach during their assessment of the Application. Further information is available on Council's website at <https://www.liverpool.nsw.gov.au/development/development-and-building>.

Regards,

Peter Nelson
Principal Strategic Planner

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   www.liverpool.nsw.gov.au



We acknowledge the traditional custodians of the land that now resides within Liverpool City Council's boundaries, the Darug and Dharawal nations and pay our respects to their Elders past, present and emerging.

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From: Mark Chilton <mark.chilton@parklifejv.au>
Sent: Wednesday, May 10, 2023 11:39 AM
To: Stella Qu <QuS@liverpool.nsw.gov.au>; Peter Nelson <NelsonP@liverpool.nsw.gov.au>
Subject: SMWSA Project - SSTOM Works Environmental Management Plans for review

Dear Peter and Stella

In relation to the emails/transmittals sent to you on the 13th March, 29th March, 5th April regarding the review of the Non-Aboriginal Heritage Management Sub-plan, Flora and Fauna Management Sub-plan, Soil and Water Management Sub-plan, Noise and Vibration Management Sub-plan and Air Quality Monitoring Program. Should you have any questions regarding any of these documents or would like to meet to discuss any issues please contact me at your convenience.

It is our intention to finalise these documents in the near term and we would greatly appreciate any comments you may have or alternately if you have no comment a response to this affect.

Kind Regards

Mark Chilton
Environment Manager
Mob. +61-0488 477 686
email: mark.chilton@parklifejv.au
Parklife Metro JV
680 George Street, Sydney NSW 2000



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3 WaterNSW

From: [Justine Clarke](#)
To: [Mark Chilton](#)
Subject: WaterNSW response - SMWSA Project - SSTOM Works - Noise and Vibration Management Sub-plan and Monitoring Program Consultation
Date: Monday, 24 April 2023 8:35:29 AM
Attachments: [image003.png](#)
[image004.png](#)
[image005.png](#)
[D2023 32886 WaterNSW response - SMWSA - CEMP CNVMP sub-plan - Apr 2023.PDF](#)

Hi Mark

Thank you for allowing WaterNSW the opportunity to comment on this subplan. Please find attached WaterNSW's comments.

If you have any questions, please do not hesitate in contacting me.

Kind Regards

Justine Clarke
Catchment and Asset Protection Adviser



Level 14, 169 Macquarie Street
PO Box 398
Parramatta NSW 2150
M: 0457 535 955
justine.clarke@waternsw.com.au
www.waternsw.com.au

From: Mark Chilton <mark.chilton@parklifejv.au>
Sent: Wednesday, 5 April 2023 2:14 PM
To: Justine Clarke <Justine.Clarke@waternsw.com.au>
Subject: ARK: SMWSA Project - SSTOM Works - Noise and Vibration Management Sub-plan and Monitoring Program Consultation

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Be careful opening emails, attachments and links from unknown senders.

Dear Justine Clark,

As part of the Sydney Metro Western Sydney Airport (SMWSA) Project, Parklife Metro will be constructing the Stations, Systems, Trains, Operations and Maintenance (SSTOM) package. You're probably aware that the SMWSA Project involves the construction and operation of a new metro line around 23km in length that extends from the existing station at St Marys in the north to a new Aerotropolis Station at Bringelly in the south, but by way of providing background to the SSTOM Project, it includes the construction of the six new metro stations, installation of tracks, signalling and support systems, construction of a stabling and maintenance facility at

Orchard Hills, as well as operation and maintenance of the newly constructed metro line.

In accordance with the SMWSA Project's infrastructure approval (SSI-10051), we have prepared a Noise and Vibration Management Sub-plan (Inc Monitoring Program) for the construction of the SSTOM Works, and as per Condition C5 of the infrastructure approval, Parklife Metro requests that WaterNSW review this document (attached) and if required, provide comment. Any review comments or issues raised will be duly considered by Parklife Metro in the name of open and honest communication and consultation.

You may have previously been contacted by other parties regarding earlier stages of the SMWSA Project, and Parklife Metro appreciates the time and effort in reviewing documents. Therefore, Parklife Metro are more than happy to offer a suitable time to go through any comments or questions regarding the reviewed documents prior to the end of the two week review period, until 23 April 2023. If you have any questions, or would like to set up a time to meet, please contact me via reply email or on 0488 477 686.

Regards,

Mark Chilton

Environment Manager

Mob. +61-0488 477 686

email: mark.chilton@parklifejv.au

Parklife Metro JV

680 George Street, Sydney NSW 2000



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