



Appendix B2

Construction Noise and Vibration Management Sub-plan

M12 Motorway June 2024

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Approval and authorisation

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Date 28.06.2024	Date 28/6/20324
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Revision history

Revision	Date	Description
А	09/09/2020	First draft for TfNSW review
В	01/10/2020	Response to TfNSW comments
С	21/10/2020	Response to TfNSW comments
D	16/07/2021	Updated with Final NSW and Commonwealth CoA
Е	06/08/2021	Response to TfNSW and ER comments
F	26/08/2021	Response to ER comments
G	19/10/2021	Updated following consultation
G.02	22/11/2021	Updated to address DPIE comments
Н	16/12/2021	Updated to address DPIE comments
I	2/12/2022	Additional design changes updates
J	13/02/2023	Response to TfNSW comments
K	19/03/2023	Response to ER comments
L	08/09/2023	Updated to address changes to NCAs
M	05/10/2023	Updated following consultation and contractor reviews
N	01/02/2024	Updated to reflect additional CAs



Revision	Date	Description
0	09/04/2024	Updated to address comments from TfNSW, ER and Construction Contractors
O.02	14/05/2024	Minor update to reference the data source for noise impacts
Р	06/06/2024	Update of figures, close out of comments



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Glossary/ Abbreviations

Abbreviations	Expanded Text
ABL	Assessment Background Level
Allowable hours	Works undertaken from 1:00pm and 6:00pm on Saturday (the work hours on Saturdays identified in the Infrastructure Approval)
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far
AR	Amendment Report
ARNTG	At-Receiver Noise Treatment Guideline (Roads and Maritime 2018)
ARSR	Amendment Report to the Submissions Report
Attenuation	The reduction in the level of sound or vibration
AVTG	Assessing Vibration – a technical guideline (DEC 2006)
CA	Consistency Assessment
ССНМР	Construction Cultural Heritage Management Plan
СЕМР	Construction Environmental Management Plan
CMS	Complaints Management System
CNVMP	Construction Noise and Vibration Management Plan
CNVG	Construction Noise and Vibration Guideline (Roads and Maritime 2016)
СоА	Condition of Approval
Commonwealth CoA	Federal Conditions of Approval under the EPBC Act
Construction	Includes all activities required to construct the CSSI as described in the documents listed in Condition A1, including commissioning trials of equipment and temporary use of any part of the CSSI, but excluding Low Impact Work which is carried out to complete prior to the approval of the CEMP, works approved under a Site Establishment Management Plan, approved under a Consistency Assessment, demolition of acquired residential houses, structures and sheds, and works specified in Appendix B and approved under an environmental management plan(s) in accordance with Condition A24.
CSSI	Critical State Significant Infrastructure
DAWE	Former Commonwealth Department of the Water, Agriculture and Environment
dB(A)	Decibels using the A-weighted scale measured according to the frequency of the human ear



Abbreviations	Expanded Text	
DCCEEW	Commonwealth Department of Climate Change, Energy, Environment and Water	
DEC	Former Department of Environment and Conservation,	
DECC	Former Commonwealth Department of Environment and Climate Change,	
DECCW	Former Department of Environment, Climate Change and Water	
DPE	Former NSW Department of Planning and Environment	
DPHI	NSW Department of Planning, Housing and Infrastructure (formerly NSW DPE which has now been split into NSW DCCEEW and NSW DPHI, with all planning functions falling to DPHI)	
DPIE	Former Department of Planning, Industry and Environment	
DR	Duration Respites	
EAD	Environmental Assessment Documentation	
EDC	Elizabeth Drive Connections	
EES	Former Environmental, Energy and Science	
EHG	Environment and Heritage Group (a part of NSW DCCEEW)	
EIS	Environmental Impact Statement	
EMM	Environmental Management Measure	
EMS	Environmental Management System	
Environmental Assessment Documentation	 The set of documents that comprise the Division 5.2 Approval: Roads and Maritime Services (October, 2019) M12 Motorway, Environmental Impact Statement (EIS) Transport for NSW (October, 2020) M12 Motorway, Submissions Report (the Submissions Report) Transport for NSW (October, 2020) M12 Motorway, Amendment Report (AR) Transport for NSW (December, 2020) M12 Motorway, Amendment Report submissions report (ARSR) Transport for NSW (March, 2021) The M12 Motorway Amendment Report Submissions Report – Amendment (ARSR amendment) WSP (October, 2021) M12 Motorway – West Package Detailed Design Consistency Assessment GHD (October, 2021) M12 Motorway – Central Package Detailed Design Consistency Assessment Arcadis (June, 2022) M12 Motorway – Sydney Water Crossings Consistency Assessment Arcadis (July, 2022) M12 Motorway – Design Boundary Changes Consistency Assessment Arcadis (August, 2022) M12 Motorway Minor Consistency Assessment for Proposed Change to the M12 Motorway Project (M12 Central) 	



Abbreviations	Expanded Text
Abbreviations	 Arcadis (September, 2023) M12 Motorway – Devonshire Road Temporary Roundabout Consistency Assessment WSP (September, 2023) M12 Motorway – Elizabeth Drive Connections Consistency Assessment TfNSW (September, 2023) M12 Motorway – Minor Consistency Assessment M12 West demolition of structures as 752 Luddenham Road TfNSW (October, 2023) M12 Motorway – Minor Consistency Assessment M12 East AF9 Power Supply TfNSW (October, 2023) M12 Motorway – Minor Consistency Assessment M12 East Cecil Road Laydown Area TfNSW (October, 2023) M12 Motorway – Minor Consistency Assessment M12 East Temporary Construction Signage Arcadis (December, 2023) M12 Motorway Project (M12 East) Sites 48, 50 and 51 Arcadis (January, 2024) M12 Motorway – Minor Consistency Assessment M12 Central Water Tower Access Road The documents that comprise the EPBC referral: Submission #3486 – The M12 Motorway Project between the M7 Motorway, Cecil Hills and The Northern Road, Luddenham, NSW Notification of referral decision and designated proponent - controlled action; date of decision 19 October 2018; ID: 2018-8286.
Environmental aspect	Defined by AS/NZS ISO 14001:2015 as an element of an organisation's activities, products or services that can interact with the environment.
Environmental impact	Defined by AS/NZS ISO 14001:2015 as any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects.
Environmental objective	Defined by AS/NZS ISO 14001:2015 as an overall environmental goal, consistent with the environmental policy, that an organisation sets itself to achieve
Environmental target	Defined by AS/NZS ISO 14001:2015 as a detailed performance requirement, applicable to the organisation or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	NSW Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPL	Environment Protection Licence
ER	Environmental Representative
ERG	Environmental Review Group – generally comprising representatives of TfNSW, ER, Project delivery team, regulatory authorities (EPA, EHG) and councils (Penrith City Council, Liverpool City Council and Fairfield City Council). The ERG will be maintained for the duration of the Project and will meet regularly and undertake environmental inspections. The role the ERG is



Abbreviations	Expanded Text
	to work collaboratively with the project team to provide proactive advice on environmental management issues on the Project.
ESM	Transport for New South Wales Environment and Sustainability Manager
ESR	Construction Contractor Environmental Site Representatives
EWMS	Environmental Work Method Statements
Feasible and reasonable	Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. Feasible relates to engineering considerations and what is practical to build. Reasonable relates to the application of judgement in arriving at a decision, taking into account mitigation benefits and cost of mitigation versus benefits provided, community views and nature and extent of potential improvements
Federal Approval	Approval (EPBC 2018/8286) for carrying out the M12 Project under Part 8 of the Environmental Protection and Biodiversity Conservation Act 1999 subject to specific CoA as detailed in Annexure A of the approval.
Highly Noise Affected	Where noise affected management level represents the level above which there may be strong community reaction to noise, determined as the exceedance of noise management levels (NML).
	Works which are defined as annoying under the Interim Construction Noise Guideline (DECC, 2009) including:
	 Use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work
	Grinding metal, concrete or masonry
Highly Noise Intensive	Rock drilling
Works	Line drilling
	Vibratory rolling
	Bitumen milling or profiling
	Jackhammering, rock hammering or rock breaking
	Impact piling.
IB	Individual briefing
ICNG	Interim Construction Noise Guideline (DECC 2009)
Infrastructure Approval	Approval (SSI 9364) for carrying out of the M12 Project under Section 5.19 of the <i>Environmental Planning and Assessment Act 1979</i> subject to specific CoA as detailed in Schedule 2 of the approval.
km	Kilometres
LAeq (15min)	The A-weighted equivalent continuous (energy average) A-weighted sound pressure level of the construction works under consideration over a 15-minute



Abbreviations	Expanded Text
	period and excludes other noise sources such as from industry, road, rail and the community
LA (max)	The A-weighted maximum noise level only from the construction works under consideration, measured using the fast time weighting on a sound level meter
LGA	Local Government Area
M7 Motorway (MOD 6 Widening)	Refers to the State Significant Infrastructure project (SSI-663-MOD 6) to construct and operate an additional lane in both directions within the existing median of the M7 Motorway, south of the Kurrajong Road overhead bridge at Prestons to the M7 Motorway bridge at Richmond. This project interacts with the M12 East stage at the M7 interchange.
M7 Widening	Shorthand term for M7 Motorway (MOD 6 Widening)
M7-M12 Integration Project	 M7 Motorway (Mod 6 Widening) (SSI 663 Mod 6) – modification (mod) to the M7 Motorway approved on 17 February 2023 under Division 5.2 of the <i>Environmental Planning and Assessment Act 1979</i> (EP&A Act) M12 Motorway (CSSI 9364) – approved on 23 April 2021 under Division 5.2 of the EP&A Act and split into separate stages or packages of work (West, Central (main construction), Central (temporary roundabout) and East). The M12 Motorway is also subject to a federal approval under the <i>Environment Protection and Biodiversity Conversation Act 1999</i>. The M7-M12 Integration project incorporates the M12 East package only.
NCAs	Noise catchment areas
NML	Noise management level
Noise affected	The noise affected level represents the point above which there may be some community reaction to noise.
NPfl	Noise Policy for Industry
NSW CoA	NSW Conditions of Approval
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water (formerly NSW DPE which has now been split into NSW DCCEEW and NSW DPHI)
NVIS	Noise and Vibration Impact Statement
OCEMP	Overarching Construction Environmental Management Plan
ocs	Overarching Communication Strategy
OEH	Office of Environment and Heritage, now EHG
ONR	Operational Noise Review
ООНЖ	Out-of-Hours Works – work completed outside of standard construction hours



Abbreviations	Expanded Text
Planning Secretary	Secretary of the NSW Department of Infrastructure, Planning and Environment, or delegate
PLO	Public Liaison Officer
Primary CoA/REMM	CoA/REMM that are specific to the development of this Plan
Project, the	M12 Motorway Project
R1	Respite Period 1
R2	Respite Period 2
RBL	The Rating Background Level for each period is the medium value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period (day, evening and night)
REMMs	Revised Environmental Management Measures
RNP	NSW Road Noise Policy (DECCW 2011)
Roads and Maritime	Former NSW Roads and Maritime Services (now Transport for New South Wales)
SAP	Sensitive Area Plan
SEAR's	Secretary's Environmental Assessment Requirements
Secondary CoA/REMM	CoA/REMM that are related to, but not specific to, the development of this Plan
SEMP	Site Establishment Management Plan(s)
Standard construction hours	Hours during which construction work is permitted by the CoA
SN	Specific notifications
SWL	Sound Power Level
SPL	Sound Pressure Level
TfNSW	Transport for New South Wales
VDVs	Vibration dose values
Work	Any physical work to build or facilitate the building of the CSSI, including low impact work, environmental management measures and utility works. However, it does not include activities that inform or enable detailed design of the CSSI and generate noise that is no more than 5 dB(A) above the rating background level at any sensitive receiver.
WSIA	Western Sydney International Airport



Abbreviations	Expanded Text
WSO Co	Western Sydney Orbital Company



1 Introduction

1.1 Context

This Construction Noise and Vibration Management Sub-plan (CNVMP or Plan) forms part of the Overarching Construction Environmental Management Plan (OCEMP) for the M12 Motorway (the Project).

This CNVMP has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), the Revised Environmental Management Measures (REMMs) listed in the M12 Motorway Environmental Impact Statement (EIS), Amendment Report, and Amendment Report Submissions Report (ARSR), all applicable legislation and Transport for New South Wales (TfNSW) specifications.

1.2 Background

TfNSW is planning to construct and operate the M12 Motorway (the Project) to provide direct access between the Western Sydney International Airport (WSIA) at Badgerys Creek and Sydney's motorway network. The M12 Motorway will run between the M7 Motorway at Cecil Hills and The Northern Road at Luddenham for about 16 kilometres (km) and is expected to be opened to traffic prior to opening of the WSIA.

The Project will be constructed in separate stages under separate construction contracts:

- M12 West between The Northern Road, Luddenham and about 250 metres east of Badgerys Creek
- M12 Central (main construction) between about 250 metres east of Badgerys Creek and the Western Sydney Parklands at Duff Road, Cecil Park
- M12 Central (Temporary Roundabout) temporary roundabout installation at Elizabeth Drive and Devonshire Road, Kemps Creek
- M12 East (as part of the M7/M12 Integration Project)
 - Elizabeth Drive Connections (EDC) a two-kilometre section from Duff Road to about 300 metres east of the M7 Motorway
 - M7/M12 Interchange An interchange between the M12 Motorway and M7
 Motorway and tie-in works for approximately four kilometres on the M7 Motorway.

The Project is subject to an approval under Division 5.2 of the *Environmental Planning and Assessment Act* 1979 (EP&A Act) as Critical State Significant Infrastructure (CSSI). The Project is also a controlled action under Section 75 of the *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act), requiring a separate approval from the Australian Minister for the Environment.

An EIS was prepared to describe and assess the Project and recommend management measures to address impacts. The EIS was exhibited by the NSW Department of Planning, Industry and Environment (DPIE; now split into the NSW Department of Planning, Housing and Infrastructure (DPHI) and Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW)) for 34 days from 16 October 2019 to 18 November 2019 to give the community and stakeholders the opportunity to provide comment.



In accordance with Section 5.17 of the EP&A Act, the Planning Secretary requested TfNSW to provide a Response to Submissions report on 29 November 2019. These were addressed within the Submission Report. Due to design developments since the exhibition of the EIS, an Amendment Report (AR) was developed to assess the impacts of these amendments. The AR was exhibited by DPIE for 14 days from 21 October 2020 to 4 November 2020. Following exhibition of the AR, an Amendment Report Submissions Report (ARSR) was developed in December 2020 to address the identified issues, followed by the ARSR – Amendment in March 2021 which addressed biodiversity matters only.

The following additional assessments have since been undertaken:

- Two Consistency Assessments (CA) for M12 West and Central addressing detailed design changes for the Project construction boundary approved in October 2021
- Sydney Water Consistency Assessment related to construction boundary extensions associated with Sydney Water utility crossings; approved in June 2022
- Design Boundary Change Consistency Assessment related to design boundary changes within the M12 alignment. This required an extension of the construction footprint and operational footprint, property adjustments and the demolition of Building No. 1 at McMasters Field Station; approved in July 2022. Threatened Species Surveys were also undertaken along the M12 alignment between September and December 2021 to satisfy the NSW Conditions of Approval (CoA) E4, E5 and E6; the outcomes of which captured within the Design CA
- Minor Consistency Assessment (M12 Central) required amendments to the construction footprint as a result of utility adjustments and tie in works, property adjustments for flood alleviation and improvements to ancillary facility access due to safety concerns, temporary widening of Elizabeth Drive and signage installation; approved in August 2022
- Devonshire Road Temporary Roundabout Consistency Assessment required to address the requirements of REMM TT10. This has resulted in an increase to the construction footprint at the Elizabeth Drive and Devonshire Road intersection to allow for the construction of a temporary roundabout; approved in September 2023.
- Elizabeth Drive Connections Consistency Assessment addressed detailed design changes for the Elizabeth Drive Connections. This involved minor construction and operation boundary adjustments, design changes, new sediment basin locations, utility works, property access changes and property adjustments; approved in September 2023.
- M12 West Minor Consistency Assessment for the demolition of structures as 752 Luddenham Road required to address the need for the demolition of structures within Ancillary Facility 11.
 Whilst this ancillary facility is already located within the construction footprint and was previously assessed in the M12 Motorway Amendment Report, the demolition and disposal of structures in this location required assessment; approved in September 2023.
- M12 East AF9 Power Supply Minor Consistency Assessment required to address a minor temporary amendment to the construction footprint in order to provide permanent site power to the construction ancillary facility 9 (AF9); approved in October 2023.
- M12 East Cecil Road Laydown Area Minor Consistency Assessment required to address temporary amendment to the construction boundary to facilitate the installation of a DN150 Steel Secondary Gas main within Cecil Road; approved in October 2023.
- M12 East Temporary Construction Signage Minor Consistency Assessment required to address temporary traffic signage installed prior to the start of temporary barriers on the M7 Motorway; approved in October 2023.



- M12 East Sites 48, 50 and 51 Minor Consistency Assessment addressed the required amendments to the construction footprint in three locations as a result of temporary traffic control measures, pavement build up and resurfacing; approved in December 2023.
- M12 Central Water Tower Access Road Minor Consistency Assessment addressed changes to the construction boundary to facilitate the construction of concrete slabs over the Sydney Water main, the construction of a temporary access road to the existing water town and radar tower, and the subsequent reinstatement of this temporary access road to pre-construction conditions; approved in January 2024.

The Project must be carried out generally in accordance with the EIS, Submissions Report, AR, ARSR and the ARSR - Amendment, M12 West and Central CA, Sydney Water CA, Design Boundary Change CA, Minor CA, Devonshire Road Temporary Roundabout CA, Elizabeth Drive Connections CA, M12 West Demolition of Structures as 752 Luddenham Road CA, M12 East AF9 Power Supply CA, M12 East Cecil Road Laydown Area CA, M12 East Temporary Construction Signage CA, M12 East Sites 48, 50 and 51 CA and M12 Central Water Tower Access Road CA in accordance with NSW CoA A1. These documents are collectively referred to as the Environmental Assessment Documentation (EAD). The CSSI must also be carried out in accordance with all procedures, commitments, preventative actions, performance outcomes and mitigation measures set out in the EAD as required by NSW CoA A2.

Approval for the Project under the EP&A Act was granted by the Minister for Planning on 23 April 2021 (SSI 9364). Approval for the Project under the EPBC Act was granted by the Federal Minister for the Environment on 3 June 2021 (EPBC 2018/8286). The Project must be carried out in accordance with the terms of the NSW and Commonwealth Approvals.

The EIS assessed the impacts of construction of the Project on noise and vibration. As part of EIS development, a detailed Noise and Vibration Assessment Report was prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning, Industry and Environment (DPIE; now Department of Planning and Environment) and the Commonwealth EIS Guidelines issued by the Commonwealth Department of the Water, Agriculture and Environment (DAWE; now Department of Climate Change, Energy, Environment and Water (DCCEEW)). The noise and vibration assessment was included in the EIS as Appendix K: Noise and Vibration.

Further assessment of noise and vibration impacts was carried out subsequent to exhibition of the EIS and incorporated into the Amendment Report. The additional assessment considered the impacts on noise and vibration due to refinements in the Project design, including changes in the Project footprint and additional ancillary facilities and associated activities. A noise and vibration supplementary technical report was included in the Amendment Report as Appendix G.

Revised Environmental Management Measures (REMMs) were provided within the AR and further updated in the ARSR. Where applicable, the REMMs from the ARSR have been included in this Plan.

Further, design development has progressed, providing additional environmental assessment, and where relevant, this detail has been included within this Plan. Section 2 of the OCEMP provides a detailed Project description.

Additionally, the M12 East Stage is being delivered as part of the M7-M12 Integration Project which includes the M7 Motorway Widening Project (MOD 6 Widening (SSI-663-MOD 6)) (referred to herein as M7 Widening) delivered by Western Sydney Orbital Company (WSO Co). During document and design development, it was identified that the Noise Catchment Areas (NCAs) between the M12 Motorway Project and the M7 Widening Project did not align. As such, a noise



assessment alignment memorandum was prepared (TN188-18F01 NCA Boundary Alignment, dated 31/07/2023, Revision 3) amending the NCAs (Appendix F). The NCAs between both Projects now align and the changes to the NCAs within M12 East have been included in this CNVMP. Section 4.2 discusses the NCA changes in further detail.

1.3 Scope of the Plan

The scope of this overarching CNVMP is to describe how the Construction Contractors propose to manage potential noise and vibration impacts during construction of the Project. The Construction Contractor responsible for each stage of the Project; M12 West, M12 Central (main construction), M12 Central (temporary roundabout), M12 East (Elizabeth Drive connections) and M12 East (M7/M12 interchange) must use this CNVMP as the basis for their section specific CNVMP, considering relevant sensitive receivers, ambient noise levels and construction activities.

In accordance with NSW CoA A7, references in the terms of this CNVMP to any guideline, protocol, Australian Standard or policy are to such guidelines, protocols, Standards or policies in the form they are in as at the date of this CNVMP.

Operational noise and vibration impacts, and operation measures do not fall within the scope of this CNVMP and therefore are not included within the processes contained within the CNVMP.

1.4 Environmental Management Systems overview

The overarching Environmental Management System (EMS) for the Project is described in Section 3 of the OCEMP. The Construction Contractor delivering the Project will have an EMS, consistent with the overarching EMS described in the OCEMP. The Construction Contractor will develop stage-specific CNVMPs in accordance with the OCEMP, the Environmental Protection Licence (EPL) and their EMS. This overarching CNVMP forms part of the environmental management framework for the Project, as described in Section 3 of the OCEMP.

The Construction Contractor will be required to develop, as part of their stage-specific CNVMPs, detailed procedures and plans to address specific requirements of the CoA and REMMs identified in this overarching CNVMP. The purpose of these environmental management documents in regard to minimisation and management of impacts on noise and vibration associated with the Project is outlined in Section 6 of this CNVMP.

The review and document control processes for this CNVMP are described in Section 6.4.2 and Section 6.6 of the OCEMP.

Management measures identified in this CNVMP may also be incorporated into site or activity specific Environmental Work Method Statements (EWMS). EWMS incorporate appropriate mitigation measures and controls and identify key procedures to be used concurrently with the EWMS. A EWMS template for use by the Construction Contractors is provided in Appendix A8 of the OCEMP. Appendix A8 also contains a template EWMS register and template EWMS training register.

EWMS will be prepared by the Construction Contractor's Environmental Site Representatives (ESR) and reviewed by the TfNSW Environment and Sustainability Manager (ESM) (or delegate) and independent Environmental Representative (ER) prior to the commencement of the construction activities to which they apply. Construction personnel undertaking a task governed by a EWMS will undertake the activity in accordance with the mitigation and management measures identified in the EWMS.



Used together, the OCEMP, strategies, procedures and EWMS form management guides that clearly identify required environmental management actions for reference by TfNSW and its Construction Contractors.

1.4.1 CNVMP preparation, endorsement and approval

This overarching CNVMP has been prepared to satisfy the NSW and Commonwealth CoA in relation to noise and vibration management during construction of the Project, particularly NSW CoA C4(b). This CVNMP includes a Construction Noise and Vibration Monitoring Program (Appendix B) to satisfy the requirements of NSW CoA C11(a) and NSW CoA C14.

This CNVMP and Construction Noise and Vibration Monitoring Program (Appendix B) were reviewed by the TfNSW Senior Project Manager and the TfNSW ESM (or delegate) and endorsed by the ER prior to submission to the Planning Secretary for approval in accordance with NSW CoA C9, NSW CoA C10 and NSW CoA C15, which was received on 21st December 2021.

This CNVMP was submitted to the Planning Secretary for approval no later than one month prior to commencement of construction of the Project.

In accordance with NSW CoA C10 and NSW CoA C16, construction of the Project did not commence prior to approval by the Planning Secretary of the CNVMP and the Construction Noise and Vibration Monitoring Program, and all relevant noise and vibration baseline data for the Project has been collected.

1.4.2 Interactions with other management plans

This Plan has the following interrelationships with other management plans and documents:

- Sensitive Area Plans (SAP) and Site Establishment Management Plan(s) (SEMP) identify
 adjacent residential and other receivers, Noise Catchment Areas and will be progressively
 updated to incorporate physical management measures identified in Construction Noise
 and Vibration Impact Statements
- Overarching Communication Strategy (OCS) details procedures and processes for community notification, consultation and complaints management
- Construction Cultural Heritage Management Plan (CCHMP) provides details of heritage structures and items in the areas surrounding the Project worksites, which are to be protected from vibration generated during the construction works.

1.5 Consultation

1.5.1 Consultation for preparation of the CNVMP

The following government agencies and stakeholders have been consulted with during the development of this CNVMP, in accordance with NSW CoA C4(b):

- WaterNSW (where vibration generating activities will impact on WaterNSW mains including the Upper Canal in a tunnel below Western Sydney Parklands and the M7 Motorway, and a Sydney Water reservoir in Western Sydney Parklands)
- Sydney Water (where vibration generating activities will impact on their water mains)
- Pipeline operators such as:



- Jemena (where vibration generating activities will impact on the Wilton to Horsley Park trunk main and Eastern Gas Pipeline)
- Penrith City Council (PCC)
- Liverpool City Council (LCC)
- Fairfield City Council (FCC).

In accordance with NSW CoA A5 (b), Table 1-1 provides a log of engagement or attempted engagement with the identified government agencies and stakeholders.

A first round of consultation was conducted with government agencies and stakeholders in 2021, prior to approval of this CNVMP. A second round of consultation was conducted with government agencies and stakeholders in response to the changes to NCAs for the M7-M12 Integration Project in September 2023. The responses are detailed in Table 1-1.

Table 1-1: Log of engagement with government agencies and stakeholders

Agency	Date	Person Contacted	Comment	Consultation Status
	9 September 2021	WaterNSW Representative	TfNSW emailed CNVMP to WaterNSW requesting comment	Open
	22 September 2021	TfNSW Representative	Response received from WaterNSW via email (See Appendix A)	Open
WaterNSW	October 2021	WaterNSW Representative	Updated Plan and response table emailed to WaterNSW to demonstrate how comments have been addressed.	Closed
	11 September 2023	WaterNSW Representative	TfNSW emailed updated CNVMP to WaterNSW requesting comment	Open
	20 September 2023	TfNSW Representative	Response received from WaterNSW via email (see Appendix A)	Closed
	9 September 2021	Sydney Water Representative	TfNSW emailed CNVMP to Sydney Water requesting comment	Open
	23 September 2021	TfNSW Representative	Response received from Sydney Water via email (See Appendix A)	Open
Sydney Water	October 2021	Sydney Water Representative	Updated Plan and response table emailed to Sydney Water to demonstrate how comments have been addressed.	Closed
	12 September 2023	Sydney Water Representative	TfNSW emailed updated CNVMP to Sydney Water requesting comment	Open



Agency	Date	Person Contacted	Comment	Consultation Status
	26 September 2023	Sydney Water Representative	TfNSW emailed Sydney Water with a reminder to provide comment	Open
	28 September 2023	TfNSW Representative	Response received from Sydney Water via email (see Appendix A)	Closed
	9 September 2021	Jemena Representative	TfNSW emailed CNVMP Jemena requesting comment	Open
	6 October 2021	TfNSW Representative	Response received from Jemena via email (See Appendix A)	Open
	7 October 2021	Jemena Representative	TfNSW emailed Jemena to clarify the Jemena response (See Appendix A)	Open
	7 October 2021	· · · · · · · · · · · · · · · · · · ·		Open
Jemena	October 2021	TfNSW Representative	Updated plan and response table emailed to Jemena to demonstrate how comments have been addressed	
	12 September 2023 Jemena TfNSW emailed updated CNVMP to Jemena requesting comment		Open	
	26 September 2023	Jemena Representative	TfNSW emailed Jemena with a reminder to provide comment	Open
	26 September TfNSW Represe	TfNSW Representative	Response received from Jemena via email	Closed
	9 September 2021	Fairfield City Council (FCC) Representative	TfNSW emailed CNVMP FCC requesting comment	Open
	27 September 2021	TfNSW Representative	Response received from FCC via email	Open
Fairfield City Council	October 2021	FCC Representative	Updated plan and response table emailed to FCC to demonstrate how comments have been addressed.	Closed
	September 2023	FCC Representative	TfNSW emailed updated CNVMP to FCC requesting comment	Open



Agency	Date	Person Contacted	Comment	Consultation Status
	25 September 2023	FCC Representative	TfNSW emailed LCC with a reminder to provide comment	Open
	25 September 2023	TfNSW Representative	Response received from FCC via email (see Appendix A)	Closed
	9 September 2021	Penrith City Council (PCC) Representative	TfNSW emailed CNVMP to PCC requesting comment	Open
Penrith City Council	7 October 2021	PCC Representative	TfNSW contacted the PCC Representative via phone and email to indicate that consultation is closed as no response has been received	Closed
	11 September 2023	PCC Representative	TfNSW emailed updated CNVMP to FCC requesting comment	Open
	22 September 2023	TfNSW Representative	Response received from PCC via email (see Appendix A)	Closed
	9 September 2021	Liverpool City Council (LCC) Representative	TfNSW emailed CNVMP to LCC requesting comment	Open
	29 September 2021	LCC Representative	TfNSW followed up and resent the CNVMP to LCC requesting comment	Open
Liverpool City	7 October 2021	LCC Representative	TfNSW contacted the LCC Representative via phone, who indicated that will send through comments in the following week (11/10/2021).	Open
Council	21 October 2021	LCC Representative	TfNSW contacted the LCC Representative to notify that as comments have not been received, consultation is considered closed.	Closed
	September 2023	LCC Representative	TfNSW emailed updated CNVMP to LCC requesting comment	Open
	21 September 2023	TfNSW	Response received from LCC via email (see Appendix A)	Open



Agency	Date	Person Contacted	Comment	Consultation Status
	29 September 2023	LCC Representative	Updated response table emailed to LCC to demonstrate how comments have been addressed.	Open
	4 October	TfNSW	Response received from LCC via email closing out comments	Closed

In accordance with NSW CoA C4 and A5, the consolidated evidence of consultation undertaken for the preparation of this CNVMP will be submitted to the Planning Secretary as part the document submission. The consolidated evidence of consultation includes:

- Documentation of the engagement with the parties identified in Table 1-3 that occurred before submitting the document to the Secretary for approval
- A log of the points of engagement or attempted engagement with the identified parties and a summary of the issues raised by them
- Documentation of the follow-up with the identified parties where feedback has not been provided to confirm that they have no feedback or have failed to provide feedback after repeated requests
- An outline of the issues raised by the identified parties, a summary of how they have been addressed and a cross reference to the section or Sub-plan of the OCEMP where the issue has been addressed
- A description of the outstanding issues raised by the identified parties and the reasons why
 they have not been addressed.

Refer to Appendix A for evidence of consultation undertaken with stakeholders and government agencies for the preparation of this Plan.

1.5.2 Ongoing consultation during construction

Ongoing consultation between TfNSW, Construction Contractors, stakeholders, and community and relevant agencies regarding the management of noise and vibration impacts will be undertaken during the construction of the Project as required. The process for the consultation will be documented in the OCS.

During construction of the Project, it may be necessary for the Construction Contractors to undertake work outside standard construction hours in the circumstances described in NSW CoA E36. On becoming aware of the need for works, the Construction Contractors will notify the ER, the Planning Secretary and the EPA of the reasons for such emergency work. Prior to carrying out such works, the Construction Contractors will use their best endeavours to notify all affected sensitive receivers of the likely impact and duration of the emergency works, as required by NSW CoA E36.

The Construction Contractor will consult with the community with regards to respite at affected locations, in accordance with the consultation requirements prescribed by NSW CoA E37 and E47. The outcomes of the community consultation, the identified respite periods and the scheduling of the likely Out-of-Hours Work (OOHW) will be provided to the EPA, ER and Planning Secretary for



information prior to the Work occurring. The consultation must include (but not be limited to) providing the community with:

- Progressive schedule for periods no less than three months, of likely out-of-hours work
- Description of the potential work, location and duration of the out-of-hours Work
- Noise characteristics and likely noise levels of the work
- Mitigation and management measures which aim to achieve the relevant noise management levels and vibration criteria under NSW CoA E38(a) and (b).

An Out-of-Hours Work Protocol is provided in Appendix C, in accordance with NSW CoA E37, for work which is outside of standard working hours and that are not subject to an EPL. The Out-of-Hours Work Protocol requires that mitigation measures for residual noise and vibration impacts on the community are selected and implemented in consultation with the community at each affected location.

In accordance with NSW CoA E39, prior to scheduling the construction works, the Construction Contractors will consult with of potentially-affected community, religious and educational institutions and noise and vibration-sensitive businesses and critical working areas (such as flight simulators, theatres, laboratories and operating theatres) to determine whether any sensitive time periods are applicable. Noise and vibration generating work resulting in noise levels above the NMLs must not be timetabled within these sensitive periods unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution.

In accordance with NSW CoA E42, the Construction Contractor will consult with WaterNSW in relation to vibration monitoring for the Upper Canal.

1.5.3 Consultation with other projects and utility providers

Consultation between TfNSW, Construction Contractors, utility providers and other projects being constructed in the area regarding the management of noise and vibration impacts will be undertaken during the construction of the Project as required. The process for the consultation is documented in the OCS including:

- Liaison with councils and utility providers. The relevant owner or provider of the service or
 utility will be consulted to make suitable arrangements for access to diversion, protection
 and support of the affected infrastructure as required. This includes consultation with
 WaterNSW in regards to vibration monitoring of the Upper Canal.
- Liaison with other projects being constructed in the area to identify potential cumulative impacts. This will include potential cumulative noise impacts during both standard working hours and out-of-hours works.

The Construction Contractor will reschedule any work to provide respite to noise impacted sensitive land users so that the respite is achieved in accordance with NSW CoA E45. The consideration of respite will also include all other CSSI, State Significant Infrastructure (SSI) and State Significant Development (SSD) projects in the area which may cause cumulative and/or consecutive impacts at receivers affected by the delivery of the CSSI.



2 Purpose and objectives

2.1 Purpose

The purpose of this CNVMP is to describe how each Construction Contractor will manage potential noise and vibration impacts during construction of the Project.

2.2 Objectives

The key objective of this CNVMP is to ensure that impacts to the local community and the built environment from noise and vibration are minimised.

To aid in achieving this objective all CoA, REMMs and licence/permit requirements relevant to noise and vibration are described, scheduled and assigned responsibility as outlined in:

- Environmental Assessment Documentation
- NSW CoA granted to the project on 23 April 2021
- TfNSW Specifications
- All relevant legislation and other requirements described in Section 3.1 of this Plan.

2.3 Targets

Targets for the management of noise and vibration impacts during the Project include:

- Full compliance with the relevant legislative requirements, CoA and environmental management measures
- Implementation of feasible and reasonable noise mitigation measures with the aim of achieving the construction NMLs detailed in the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009)
- Implementation of feasible and reasonable vibration mitigation measures with the aim of achieving the vibration criteria established using the Assessing vibration: a technical guidelines (DEC, 2006) (for human exposure)
- Minimising impacts on, and complaints from, the community and stakeholders.



3 Environmental requirements

3.1 Relevant legislation

3.1.1 Legislation

Legislation and regulations relevant to noise and vibration management includes:

- Protection of the Environment Operations Act 1997 (POEO Act)
- Protection of the Environment Operations (Noise Control) Regulation 2017.

Relevant provisions of the above legislation are identified in the register of legal requirements included Appendix A1 of the OCEMP.

3.1.2 Guidelines

The main guidelines, specifications and policy documents relevant to this Plan include:

- Construction noise
 - TfNSW Specification G36 Environmental Protection (Management System)
 - Interim Construction Noise Guideline (ICNG), Department of Environment and Climate Change 2009
 - Construction Noise and Vibration Guidelines (TfNSW, 2016)
 - Draft Construction Noise and Vibration Guidelines (TfNSW, 2019)
 - Road Noise Policy (Department of Environment, Climate Change and Water, 2011).
- Construction vibration
 - TfNSW Specification G36 Environmental Protection (Management System)
 - Assessing Vibration a technical guideline (AVTG) (Department of Environment and Conservation, 2006)
 - German Standard DIN4150-1999 Structural vibration Part 3: Effects of vibration on Structures (Deutsches Institute fur Normung, 1999)
 - British Standard 7385: Part 2-1993 'Evaluation and measurement of vibration in buildings Part 2 (BSI, 1993)
 - Australian Standard AS/NZS 2107:2000 Acoustics Recommended design sound levels and reverberation times for building interiors.
- Construction sleep disturbance guidance
 - Road Noise Policy (Department of Environment, Climate Change and Water, 2011)
 - Noise Policy for Industry (Environment Protection Authority, 2017).
- PS311 Environmental Design and Compliance



3.2 Minister's Conditions of Approval

The primary NSW CoA relevant to the development of this Plan are listed in Table 3-1 below. Secondary conditions relevant to this Plan have been listed in Appendix D. A cross reference is also included to indicate where the condition is addressed in this Plan or other project management documents.

Table 3-1: Minister's Conditions of Approval

CoA	Condition Requirements		Applicability		Document
No.		M12 West	M12 Central	M12 East	Reference
C4	The following CEMP Sub-plans must be prepared in consultation with the relevant agencies identified for each CEMP Sub-plan . Details of all information requested by an agency during consultation must be included in the relevant CEMP Sub-plan , including copies of all correspondence from those agencies. (b) Noise and vibration - WaterNSW, Sydney Water and pipeline operators (where vibration generating	√	*	✓	Section 1.5.1
	activities will impact on their assets) and relevant council(s)				
C6	The Noise and Vibration CEMP Sub-Plan must include, but not be limited to:	✓	✓	✓	This Plan
	(a) details of all sensitive land uses (including noise and/or vibration sensitive working areas) that are potentially exposed to construction noise and vibration;				Section 4.1
	(b) construction noise and vibration performance criteria for the CSSI;				Section 5
	(c) details of mitigation and management measures and procedures that will be implemented to manage construction noise and vibration impacts				Section 8
	(d) construction timetabling, in particular construction activities outside of standard hours; and				Section 5.3.1 Section 5.3.4
	(e) measures to minimise cumulative construction impacts and the likelihood for construction fatigue from both concurrent activities and other projects in the area.				Section 8



CoA	Condition Requirements	Applicability			Document
No.		M12 West	M12 Central	M12 East	Reference
C11	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies 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: (a) Noise and vibration - relevant councils	✓	*	✓	Appendix B
C14	 The Construction Noise and Vibration Monitoring Program must include, but not be limited to: (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; (b) noise monitoring during the day, evening and night time periods throughout the construction period, covering the range of activities (including worst-case construction noise levels) being undertaken; (c) method and frequency for reporting monitoring results; and (d) procedures to identify and implement additional mitigation measures where monitoring indicates noise and/or vibration levels in excess in excess of noise and vibration criteria. 	✓	✓	✓	Section 9.5.1 Section 6.2 of Appendix B
E34	Work must only be undertaken during the following hours: (a) 7:00 am to 6:00 pm Mondays to Fridays, inclusive; (b) 8:00 am to 6:00 pm Saturdays; and (c) at no time on Sundays or public holidays.	√	~	✓	Section 5.3.1
E35	Except as permitted by an EPL, highly noise intensive works that result in an exceedance of the applicable noise management level (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.	√	~	√	Section 5.3.2



CoA	Condition Requirements		Applicabilit	Document	
No.		M12 West	M12 Central	M12 East	Reference
	For the purposes of this condition, 'continuously' includes any period during which there is less than one hour between ceasing and recommencing any of the Work.				
E36	Notwithstanding Condition E34 and E35, Work may be undertaken outside the hours specified in any of 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 On becoming aware of the need for emergency work in accordance with Condition (E36(a), the Proponent must notify the ER, the Planning Secretary and the EPA of the reasons for such emergency work. The Proponent must use best endeavours to notify all noise and/or vibration affected sensitive land user(s) of the likely impact and duration of the emergency work.	√	✓	√	Section 5.3.3
	(b) Work that causes:				
	(i) 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) LAFmax(15 minute) noise levels no more than 15 dB(A) above the rating background level at any residence during the night time period; and				
	(iii) continuous or impulsive vibration values, measured at the most affected residence, thatare no more than the preferred values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006); and				



CoA	Condition Requirements		Applicabilit	Document	
No.		M12 West	M12 Central	M12 East	Reference
	(iv) intermittent vibration values measured at the most affected residence that are no morethan 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 <u>not</u> subject to an EPL that are approved under an Out-of-Hours WorkProtocol as required by Condition E37; or				
	(iii) negotiated agreements with directly affected residents and sensitive land user(s).				
E37	An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of Work which is outside the hours defined in Condition E34 , and that are not subject to an EPL. The Protocol must be approved by the Planning Secretary beforecommencement of the out-of-hours Work. The Protocol must be prepared in consultation with the ER . The Protocol must provide:	✓	✓	✓	Section 1.5.2 Section 5.3.4 Appendix C
	(a) identification of low and high-risk activities and an approval process that considers the riskof activities, proposed mitigation, management, and coordination, including where:				
	(i) the ER reviews all proposed out-of-hours activities and confirm 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;				
	(b) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria;				
	(c) 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 E47 . 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) will be exposed to, including the number of noise awakening events;				



CoA	Condition Requirements	1	Applicabilit	У	Document
No.		M12 West	M12 Central	M12 East	Reference
	 (d) 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 (e) notification arrangements for affected receivers for all approved out-of-hours Work and notification to the Planning Secretary of approved low risk out-of-hours Work. This condition does not apply to Work where the requirements of Condition E36(a) or (b) are met. 				
E38	 Mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration objectives (a) construction 'Noise affected' NML established using the Interim Construction Noise Guideline (DECC, 2009); (b) vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure); (c) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and (d) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures (for structural damage). Any construction or early works identified as exceeding the noise management levels and/or vibration criteria must be managed in accordance with the respective Noise and Vibration CEMP Sub-plan or Early Works Environmental Management 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 NML. 	•		•	Section 2.3 Section 8
E39	Noise generating work in the vicinity of potentially-affected community, religious, educational institutions, 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 offers of other reasonable arrangements have been made to the affected institutions and are implemented at no cost to the affected institution.	✓	✓	✓	Section 1.5.2 Section 8



CoA	Condition Requirements	Į.	Applicabilit	у	Document
No.		M12 West	M12 Central	M12 East	Reference
E40	Noise and Vibration Impact Statements (NVIS) must be prepared for any Work that may exceed the noise management levels and vibration criteria specified in Condition E38 at any residence outside the construction hours identified in Condition E34, or where receivers will be highly noise affected. The NVIS 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 Work. A copy of the NVIS must be provided to the ER prior to the commencement of the associated Work. The Planning Secretary may request a copy/ies of the NVIS.	√	✓	√	Section 8 Appendix C
E41	Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage must be notified before Work that generates vibration commences in the vicinity of those properties. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owners and occupiers must be provided with 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 required by Condition C4 and the Communication Strategy required by Condition B1.	~	✓	√	Section 8 Section 9.9.1 OCS
E42	The Proponent must conduct vibration testing during vibration generating activities that have the potential to impact on heritage items to identify minimum working distances to prevent cosmetic damage. In addition, vibration monitoring must be undertaken during construction for relevant remaining Fleurs Radio Telescope structures, the Upper Canal (in consultation with WaterNSW) and McMaster Farm and McGarvie-Smith Farm group of remaining buildings. 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.	√	✓	√	Section 8
E43	Advice from a heritage specialist must be sought on methods and locations for installing equipment used for vibration, movement and noise monitoring at heritage-listed structures.	✓	✓	✓	Section 5.6 Section 8



CoA	Condition Requirements	Applicability			Document Reference	
No.			2 M12 M12 st Central East			
E44	Before conducting at-property treatment at any heritage item identified in the documents listed in Condition A1, the advice of a suitably qualified and experienced built heritage specialist must be obtained and implemented to ensure such work does not have an adverse impact on the heritage significance of the item.	✓	~	✓	Section 8	
E45	 All Work undertaken for the delivery of the CSSI, including that 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 user(s) so that the respite is achieved in accordance with Condition E47; or (b) where respite outlined in Condition E47 cannot be achieved, consider the provision of alternative respite or mitigation to impacted noise sensitive land user(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 CSSI, SSI and SSD projects which may cause cumulative and/or consecutive impacts at receivers affected by the delivery of the CSSI. 	✓	✓	✓	Section 1.5.3 Section 8 Appendix C	
E46	Mitigation measures such as temporary alternative accommodation or other agreed mitigation measures, must be offered/ made available to residents affected by out-of-hours Work (including where utility works are being undertaken for the CSSI or under a road occupancy licence) where the construction noise levels between: (a) 10:00 pm and 7:00 am, Monday to Friday; (b) 10:00 pm Saturday to 8:00 am Sunday; and (c) 6:00 pm Sunday and public holidays to 7:00 am the following day unless that day is Saturday then to 8:00 am, are predicted to exceed the NML by 25 dB(A) or are greater than 75 dBA (LAeq(15 min)), whichever is the lesser and the impact is planned to occur for more than two (2) nights over a seven (7) day rolling period.	√	✓	√	Section 8 Appendix C	



CoA No.	Condition Requirements	Applicability			Document	
		M12 West	M12 Central	M12 East	Reference	
	The NML must be reduced by 5 dB where the noise contains annoying characteristics and may be increased by 10 dB if the property has received at-property noise treatment. The noise levels and duration requirements identified in this condition may be changed through an EPL applying to the CSSI.					
E47	In order to undertake out-of-hours Work outside the hours specified under Condition E34, the Proponent must identify appropriate respite periods for the out-of-hours work 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 noisemanagement levels and vibration criteria under Condition E38(a) and (b) (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 for information prior to Work scheduled for the subject period being undertaken.	✓	*	✓	Section 1.5.2 Section 8 Appendix C	
	Note: Respite periods can be any combination of days or hours where out-of-hours work will not be more than 5 dB(A) above the rating background noise level at any residence.					
E48	Crushing and grinding works must only be undertaken during the hours specified in Condition E34 unless otherwise approved by the Planning Secretary or through an EPL or it meets the requirements of Condition E36(a).	✓	✓	✓	Section 8	
E49	Blasting is not permitted as part of this CSSI approval.	✓	✓	✓	Section 8	



CoA No.	Condition Requirements	Applicability			Document
			M12 Central	M12 East	Reference
E56	The implementation of at-property treatment does not preclude the application of other noise and vibration mitigation and management measures including temporary accommodation to address construction noise.	√	✓	√	Section 8
E76	The Proponent must offer pre-construction surveys to the owners of surface and sub-surface structures and other relevant assets identified at risk from vibration, including all listed heritage items and buildings/structures of heritage significance as identified in the documents listed in Condition A1. Where the offer is accepted, the survey must be undertaken by a suitably qualified and experienced engineer and/or building surveyor prior to the commencement of vibration- generating works that could impact on the structure/asset. The results of each survey must be documented in a Pre-construction Condition Survey Report and the report must be provided to the owner of the item(s) surveyed no later than one (1) month before the commencement of all other potentially impacting works	√	✓	~	Section 8
E77	Where pre-construction surveys have been undertaken in accordance with Condition E76, subsequent post-construction surveys of the structure / asset must be undertaken by a suitably qualified and experienced engineer and/or building surveyor to assess damage that may have resulted from the vibration-generating works. The results of the post-construction surveys must be documented in a Post-Construction Condition Survey Report for each item surveyed. The Post-construction Condition Survey Reports must be provided to the owner of the structures/assets surveyed, and no later than four (4) months following the completion of construction activities that have the potential to impact on the structure / asset	√	√	√	Section 8



3.3 Revised Environmental Management Measures

The primary REMMs relevant to the development of this Plan are listed in Table 3-2 below. Secondary REMMs relevant to this Plan are listed in Appendix D. A cross reference is also included to indicate where the REMM is addressed in this Plan or other Project documents.

Table 3-2: Environmental management measures relevant to this Plan

ID	Measure/Requirement	Timing	Applicability			Document	
			M12 West	M12 Central	M12 East	Reference	
NV01	A construction noise and vibration management plan (CNVMP) will be prepared for the project to mitigate and manage noise and vibration impacts during construction. The CNVMP will be implemented for the duration of construction of the project and will:	Prior to and during construction	during	*	✓	~	This Plan
	Identify nearby sensitive receivers					Section 4.1	
	Include a description of the construction activities equipment and working hours					Section 7.1	
	Identify relevant noise and vibration performance criteria for the project and license and approval conditions.					Section 5.2 Section 5.6	
	Include modelling results showing construction noise impacts based on detailed design information					Section 7	
	 Outline standard and additional mitigation measures from the Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime 2016) and information about when each will be applied 					Section 8	
	Outline requirements for the development and implementation of an Out-of-hours Work Protocol					Section 5.3.4 Appendix C	
	Outline requirements for noise and vibration monitoring that will be carried out to monitor project performance associated with the noise and vibration criteria					Section 9.5 Appendix B	



ID	Measure/Requirement	Timing	A	Applicability	Document	
			M12 West	M12 Central	M12 East	Reference
	Describe community consultation and complaints handling procedures in accordance with the Community Communication Strategy to be developed for the project					Section 1.5 OCS
	Outline measures to manage noise impacts associated with heavy vehicle movements both on and offsite					Section 8
	Outline measures to minimise cumulative construction impacts and the likelihood for 'construction fatigue' from concurrent and consecutive projects in the area					Section 8
	Outline requirements to minimise and manage construction fatigue, in consultation with the community.					Section 8



3.4 TfNSW Specifications

The TfNSW Specifications set out the minimum requirements for the detailed outcomes in terms of quality or performance expected in the finished product for construction projects and are relevant to various construction activities on work sites to minimise impacts to the environment. The TfNSW Specifications are Project contract documents and are not publicly accessible.

The Construction Contractor will incorporate the appropriate M12 TfNSW Specifications into the stage specific CNVMPs including the requirements from, but not limited to:

- G1 Job Specific Requirements
- G2 General Requirements
- G10 Traffic Management
- G36 Environmental Protection
- G40 Clearing and Grubbing
- G61 Communication and Community Engagement
- R44 Earthworks.



4 Existing environment

The following section summarises the existing noise and vibration conditions within and adjacent to the Project corridor, based on information contained in the EAD. The information provided below comprises the baseline data used for the Construction Noise and Vibration Monitoring Program (Appendix B). As referenced in the AR, it was previously considered that the baseline data obtained during the EIS was sufficiently comprehensive and that no further baseline data was required to be collected by the Construction Contractors. However, given that the M12 East will be delivered concurrently to theM7 Widening Project as an Integrated Project, the following sections have been updated to reflect baseline data from the M7 Widening Project; additional unattended monitoring is described in Section 4.3.3. Notwithstanding, attended noise monitoring will be carried out prior to the commencement of construction to verify the noise environment.

The noise environment within the suburban areas is generally influenced by sources of road traffic noise from the M7 Motorway and Elizabeth Drive, particularly during the daytime period. During the evening and night-time periods, ambient noise levels typically decrease due to a reduction in the volume of road traffic on Elizabeth Drive and the M7 Motorway. The noise environment in the rural locations is generally influenced by environmental noises such as wind and insects.

4.1 Sensitive receivers

The Project is situated within three local government areas (LGAs); Penrith to the north, Fairfield to the east and Liverpool to the south. The Project will also pass through the Western Sydney Parklands at its eastern extent. The Project includes a mix of rural and suburban areas in the South West Sydney Growth Area and Western Sydney Aerotropolis and will traverse the following suburbs from east to west; Abbotsbury, Cecil Park, Cecil Hills, Mount Vernon, Kemps Creek, Badgerys Creek and Luddenham.

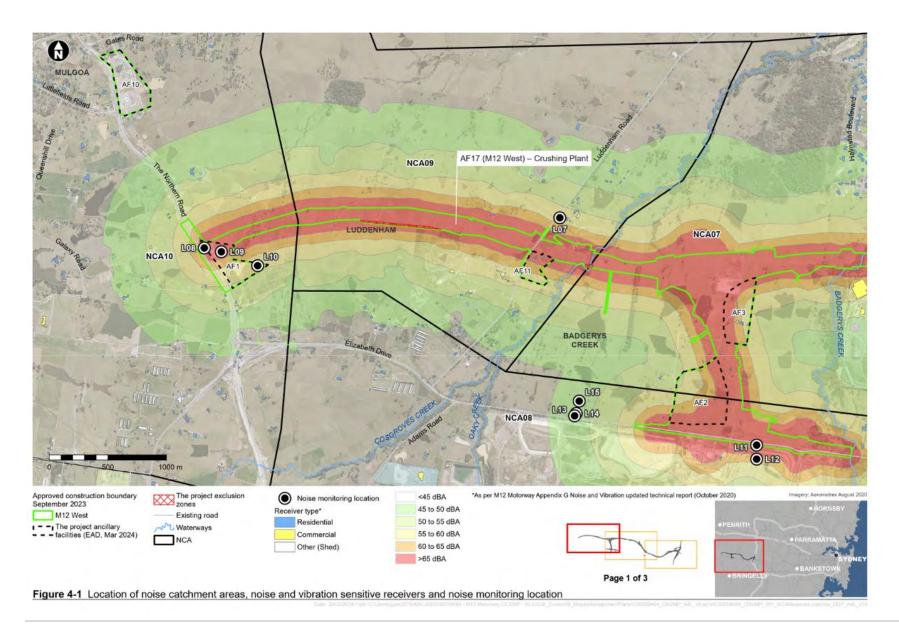
The study area includes a mix of rural and suburban areas. Cecil Hills, Abbotsbury (suburban areas), Cecil Park and Mount Vernon (small-lot rural residential areas) are located in the eastern section of the project near to the M7 Motorway and Elizabeth Drive. Kemps Creek, Badgerys Creek and Luddenham are in the western section of the project which are sparsely populated and consist primarily of large rural lots.

The noise and vibration assessment in the Environmental Assessment Documentation identified and considered potential noise and vibration impacts for sensitive receivers along the Project alignment. Receivers potentially sensitive to noise and vibration were categorised as residential dwellings, commercial/industrial buildings (including small businesses), or 'other' sensitive land uses which includes educational institutions, childcare centres, medical facilities, and places of worship. Sensitive receivers potentially affected by the Project are concentrated in Kemps Creek and Cecil Park in M12 East. The central and western sections of the Project area are mainly semi-rural properties with few residences.

Noise sensitive receivers and the NCAs for the Project are shown in Figure 4-1 (see Section 4.2 for further detail regarding NCAs). The predicted noise contours for the bulk earthworks – peak impact scenario has been included as a reference for predicted construction noise impacts.

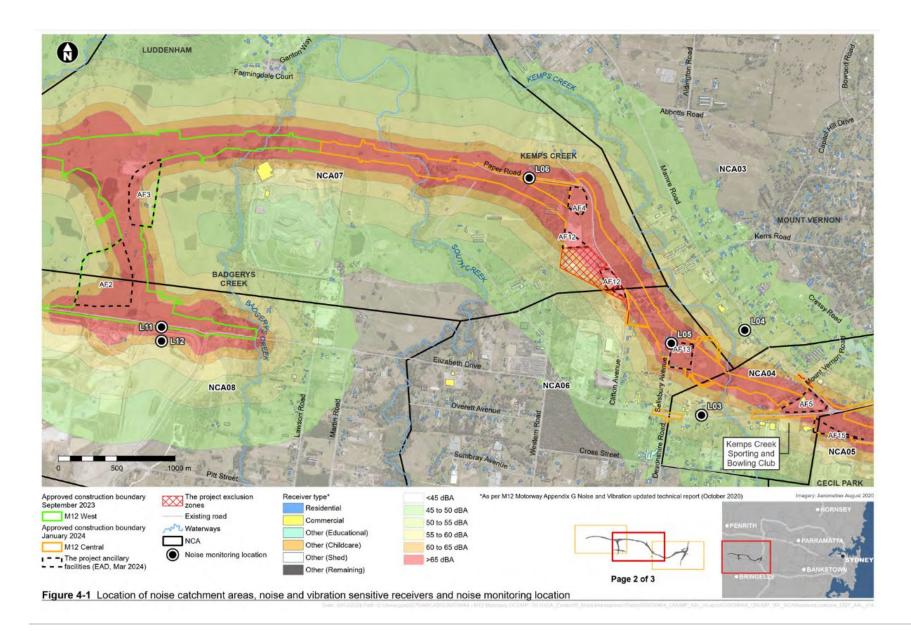
Predicted construction noise contours for the various scenarios can be found on the M12 Motorway web portal (https://caportal.com.au/rms/m12) and within the M12 Motorway Amendment Report Appendix G Noise and Vibration updated technical report.





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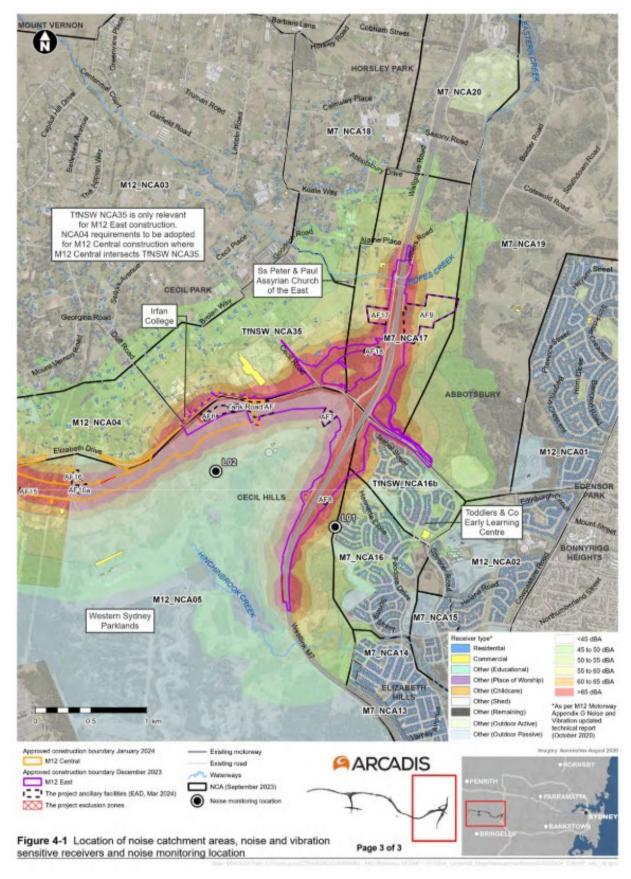


Figure 4-1: M12 noise catchment areas, noise and vibration sensitive receivers and noise monitoring locations



4.2 Noise catchment areas

NCAs were nominated within the Project EAD. NCAs that reflect land uses and the nature and types of receivers within each NCA were established as part of the noise assessment. The NCAs were selected to be representative of the varying land uses and noise environment of sensitive receiver locations around the Project.

As discussed in Section 1.2, the M7-M12 Integration project encompasses the M12 East stage and the M7 Widening projects. The various noise assessments for each Project were undertaken at separate times, as such, the NCAs reported between where M12 East stage and the M7 Widening project interact were different, (noting that there are no changes to the NCAs in M12 West and Central stages). To allow for consistent management of potential noise impacts, NCA boundaries have been realigned with reference to the most appropriate NCAs relevant to each project. The selection and adjustments of NCA boundaries were determined in the technical memorandum "M7-M12 Interchange Project – Noise Catchment Area Alignment" (TN188-18F01 NCA Boundary Alignment, dated 31/07/2023, Revision 3) (Appendix F) and was undertaken using the following procedure:

- Where NCAs are defined for the M7 Widening, adopt the NCA and associated noise logging results. With reference to the M12 NCAs, where an overlap occurs between the M12 and M7 NCAs, the former would be adjusted to align with the latter
- Adjust the NCA boundaries to align with logical and reasonable features (e.g. along road), where required
- Subdivide NCAs near key areas of the Project, such as the M7-M12 interchange, to follow logical boundaries and consider representative background noise levels for the potentially most noise affected receivers. New NCAs may require additional noise monitoring to establish existing background and ambient noise levels.

This methodology was proposed as the recent noise logging measurements were conducted for the M7 Widening Project and the M12 noise loggers were positioned further away from the potentially most noise-affected residences.

As a result of this assessment, the M12 NCA01, NCA02, NCA03 and NCA04 NCAs have been adjusted to allow for the representative NCA areas for the M7-M12 Integration Project. Consequently, the minimum horizontal distance, in metres, from the Project to the nearest sensitive receiver within the NCA has also changed. In particular, the original extent of NCA04 has as described in the M12 AR has been divided into NCA35 and M7_NCA17. However, for the purpose of M12 Central, where NCA35 overlaps with the M12 Central, the M12 Central Construction Contractor will utilise the NML associated with NCA04 only. The NML associated with NCA35 and M7_NCA17 would apply to M12 East only. This is because:

- The change in NCA is relevant to the noise environment and land use characteristics associated with M12 East and M7 Motorway Projects
- The existing NCA04 NML are more stringent than that developed for NCA35; as such, M12 Central would be taking a conservative approach to noise management.

There are now 18 NCAs associated with the Project; the land use characteristics within each NCA are described in Table 4-1.



It is noted that M7 NCA13, NCA20 and NCA21, which are adjacent to the M12 boundaries, are relevant only to M7 project and not considered within the context of the M12 Motorway Project construction noise impacts. Consequently, these NCAs are not displayed in Table 4-1 as they are beyond the extent of the M12 construction noise impacts.

Table 4-1: Noise catchment areas

NCA	Minimum distance	Description	Source
M12_NCA01	782 m	This catchment area is located east of the M7 Motorway and extends south to Elizabeth Drive. Receivers in this catchment are largely residential with the nearest receiver located 782 m to the east of the Project.	M7-M12 Interchange project – Noise Catchment Area alignment" (reference: TN188-18F01 NCA Boundary Alignment, dated 31/07/2023, Revision 3
M12_NCA02	544 m	This catchment area is located to the south of Elizabeth Drive and east of the M7 Motorway. It is primarily suburban residential with the nearest receivers located 544 m to the east of the Project.	M7-M12 Interchange project – Noise Catchment Area alignment" (reference: TN188-18F01 NCA Boundary Alignment, dated 31/07/2023, Revision 3
M12_NCA03	239 m	This catchment area is located to the north of Elizabeth Drive and west of the M7 Motorway, extending to the west of Mamre Road. The nearest receivers are located north of the Project on Mamre Road.	M7-M12 Interchange project – Noise Catchment Area alignment" (reference: TN188-18F01 NCA Boundary Alignment, dated 31/07/2023, Revision 3
M12_NCA04 ²	90 m	This catchment area is located to the north of Elizabeth Drive and west of the M7 Motorway and extends west to the intersection of Devonshire Road and Cross	M7-M12 Interchange project – Noise

¹ Approximate minimum horizontal distance in metres from the project to the nearest sensitive receiver.

² The Devonshire Road temporary roundabout works is considered temporary and localised compared to the overall Project. These works are adjacent to residential receivers but not reflected in the minimum distance to NCA04 and NCA06.



NCA	Minimum distance	Description	Source
		Street and east to Duff Road. It is primarily residential with the nearest receivers located adjacent the Project on the north of Elizabeth Drive. As described previously, M12 Central will utilise NML associated with NCA04 where NCA35 overlaps with the M12 Central boundary.	Catchment Area alignment" (reference: TN188-18F01 NCA Boundary Alignment, dated 31/07/2023, Revision 3
M12_NCA05	60 m	This catchment area is located to the south of Elizabeth Drive and west of the M7 Motorway and extends west to Kemps Creek. It primarily consists of the Western Sydney Parklands with no residential receivers	M12 Amendment Report (AR)
M12_NCA06 ²	70 m	This catchment area is located to the west of Kemps Creek and east of South Creek and extends to the north and south of Elizabeth Drive. It primarily consists of rural residential receivers.	M12 AR
M12_NCA07	100 m	This catchment area is located to the west of Kemps Creek, east of Cosgroves Creek, and north of Elizabeth Drive. This catchment primarily consists of rural residential receivers and a cluster of residential dwellings 500 metres to the north of the Project.	M12 AR
M12_NCA08	420 m	This catchment area is located along the western section of Elizabeth Drive to the west of South Creek and east of The Northern Road. This catchment is primarily rural residential and encompasses the Western Sydney International Airport project.	M12 AR
M12_NCA09	90 m	This catchment area is located to the west of Cosgroves Creek, east of The Northern Road, and north of Elizabeth Drive. It is set back from Elizabeth Drive and The Northern Road to represent receivers which are not adjacent to the existing major roads. This catchment represents mostly rural receivers.	M12 AR
M12_NCA10	160 m	This catchment area is located along The Northern Road. It is primarily rural residential with the nearest receivers located opposite the west end of the project to the west of The Northern Road.	M12 AR
TfNSW_NCA35	25 m	This catchment area is located north of Elizabeth Drive, about 300 m west of the M7. It is bounded by Goodrich Road and Brolen Way in the north, Duff Road in the west, and Elizabeth Drive in the south. It is primarily rural residential with some industrial facilities. The closest residential receivers are near the intersection of Elizabeth Drive and Duff Road. The NML for NCA35 will be utilised for M12 East only.	M7-M12 Interchange project – Noise Catchment Area alignment" (reference: TN188-18F01 NCA Boundary



NCA	Minimum distance	Description	Source
			Alignment, dated 31/07/2023, Revision 3
TfNSW_NCA16b	12 m	This catchment is located south of Elizabeth Drive, in between the M7 and Sandringham Drive. It is primarily suburban residential, describing northwest Cecil Hills, with receivers about 12 m to 20 m away from the project works on Elizabeth Drive.	M7-M12 Interchange project – Noise Catchment Area alignment" (reference: TN188-18F01 NCA Boundary Alignment, dated 31/07/2023, Revision 3
M7_NCA14	80 m	This catchment area is located east of Dobroyd Drive and west of Hinchinbrook Creek. This primarily suburban residential area describes the receivers in Elizabeth Hills not immediately adjacent to the M7.	M7 Widening
M7_NCA15	600 m	This catchment area is located east of Hinchinbrook Creek and mainly encompasses the suburban residential receivers around Cecil Hills Public School.	M7 Widening
M7_NCA16	170 m	This catchment area is located between the M7 and Dnumbral Park in Cecil Hills. It primarily consists of suburban residential receivers in western Cecil Hills.	M7 Widening
M7_NCA17	90 m	This catchment consists of receivers 300 m to 400 m away from the M7 in between Abbotsbury Drive in the north and Elizabeth Drive in the south. It consists of some rural residential receivers along Wallgrove Road which runs parallel to the M7.	M7 Widening
M7_NCA18	190 m	This catchment area starts from about 200 m west of the M7 and extends up to Arundel Road. It is bounded by Eastern Creek in the north and Ropes Creek to the south. It primarily consists of rural residential receives and some industrial facilities.	M7 Widening
M7_NCA19	490 m	This catchment area primarily includes the Western Sydney Parklands, south of Prospect Reservoir Eastern Creek and north of Elizabeth Drive. It primarily consists of the recreational receivers located in the Parklands.	M7 Widening



4.3 Ambient noise

The ambient noise environment is dominated by a combination of road traffic noise in the vicinity of major roads and general environmental noise (such as wind and insects) in the more rural locations.

The rating background level (RBL) is used to determine the appropriate noise management level (NML). The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours).

Works undertaken from 1:00pm and 6:00pm on Saturday (the allowable work hours on Saturdays identified in the Infrastructure Approval) have been assessed in the Environmental Assessment Documentation as Daytime OOH.

Unattended noise surveys were completed at a number of locations across the M12 and M7 project areas to determine the RBL. Monitoring equipment for these surveys was generally located at receivers which will have line-of-sight to the Project or to existing major roads, within constraints such as accessibility, security and permission of landowners.

4.3.1 M12 Motorway

Unattended noise surveys in the Project area were conducted at 15 locations as part of the preparation of the Environmental Assessment Documentation, namely the EIS in 2017, and the Amendment Report in 2020. The measured noise levels were used to determine the existing noise environment and to set criteria to assess the potential impacts from the Project.

A summary of the noise monitoring results and adopted RBLs is provided in Table 4-2.

Table 4-2: Ambient noise monitoring results (dB(A))

ID	Backgroui	level (period) Road	le noise LA _{eq} based on Noise icy ⁴				
	Morning shoulder	Day	Day Evening Evening shoulder Nig		Night	Day 15 hour	Night 9 hour
L01	51	45	44	46	40	52	51
L02	47	36	39	41	34	46	45
L03	60	54	48	56	37	66	63
L04	54	48	46	52	37	57	55

³ RBL periods are based on extended construction hours: Morning shoulder is 6:00 am to 7:00 am Monday to Friday; Daytime is 7:00 am to 6:00 pm Monday to Saturday and 8:00 am to 6:00 pm Sunday and Public Holidays; Evening is 7:00 pm to 10:00 pm Monday to Friday and 6:00 pm to 10:00 pm Saturday, Sunday and Public Holidays; Evening shoulder is 6:00 pm to 7:00 pm Monday to Friday; Night-time is 10:00 pm to 6:00 am Monday to Friday, 10:00 pm to 7:00 am Saturday and 10:00 pm to 8:00 am Sunday and Public Holidays

⁴ LAeq periods are based on the Road Noise Policy: Daytime is 7:00 am to 10:00 pm; Night-time is 10:00 pm to 7:00 am.



ID	Backgroui	Average noise level LA _{eq} (period) based on Road Noise Policy ⁴					
	Morning shoulder						
L05	49	39	42	45	35	49	48
L06	43	34	35	39	31	53	44
L07	46	40	36	42	31	56	52
L08	58	46	50	57	34	60	59
L09	56	44	48	54	36	56	55
L10	51	40	44	49	37	51	49
L11	57	46	40	51	31	69	66
L12	50	40	37	44	30	49	48
L13	50	42	38	48	33	64	60
L14	50	42	39	48	33	55	52
L15	50	39	40	47	34	52	49

4.3.2 M7 Widening

Ambient noise monitoring was undertaken at 19 locations between 23 February and 11 March 2021 as part of the M7 Widening Environmental Impact Statement (EIS) (SSI-663).

The locations for the unattended noise loggers were determined through examination of aerial photography and site inspections. Table 4-3 also presents the ambient LAeq levels at each monitoring location that intersects the M12 East Stage of the Project. The noise levels presented in Table 4-3 indicate that the noise environment at the measurement locations is typical of those located along major transport corridors in suburban/urban noise areas, where daytime and evening background levels are high due to heavy and continuous traffic flows. The night-time background levels tend to decrease as a result of reduced traffic flows.



Table 4-3: Ambient noise monitoring results (dB(A)) – M7 Widening

ID	Address		Background noise level (RBL) – Periods based on extended construction hours						
		Morning shoulder	Day	Evening	Evening shoulder	Night	Day 15 hour	Night 9 hour	
NL9	Lot 35, DP1021940, Cecil Park	55	65	57	51	45	70	66	
NL10	Lot 24, DP1042996, Cecil Park	52	59	54	50	45	66	63	
NL11	20 Toulouse Street, Cecil Hills	42	44	43	41	39	56	50	

Notes:

4.3.3 TfNSW Unattended Noise Surveys (2022)

Unattended noise surveys (Table 4-4) were undertaken around the M7/M12 interchange between 18 November to 27 November 2022 at the following two locations:

- 33 Isabel Street, Cecil Hills
- 1111 Elizabeth Drive, Cecil Hills.

The purpose of the monitoring was to determine the ambient noise environment at this location to verify and calibrate the operational noise model. The monitoring undertaken was then made available to inform the NCA alignment report (Appendix F).

Table 4-4: Ambient noise monitoring results (dB(A))

ID		ound no extende	Average noise level LA _{eq} (period) based on Road Noise Policy ⁶				
	Morning shoulder	Day	Evening	Evening shoulder	Night	Day (15 hour)	Night (9 hour)
33 Isabel Street, Cecil Hills	42	48	45	42	38	56	50

⁵ RBL periods are based on extended construction hours: Morning shoulder is 6:00 am to 7:00 am Monday to Friday; Daytime is 7:00 am to 6:00 pm Monday to Saturday and 8:00 am to 6:00 pm Sunday and Public Holidays; Evening is 7:00 pm to 10:00 pm Monday to Friday and 6:00 pm to 10:00 pm Saturday, Sunday and Public Holidays; Evening shoulder is 6:00 pm to 7:00 pm Monday to Friday; Night-time is 10:00 pm to 6:00 am Monday to Friday, 10:00 pm to 7:00 am Saturday and 10:00 pm to 8:00 am Sunday and Public Holidays

¹ Rating Background Level

² Application notes to the Noise Policy for Industry indicate that the community generally expects a greater control of noise during the evening and night as compared to the daytime. Therefore the rating background level for the evening is set to no more than that for the daytime and the night-time to no more than the evening.

⁶ LAeq periods are based on the Road Noise Policy: Daytime is 7:00 am to 10:00 pm; Night-time is 10:00 pm to 7:00 am.



ID			oise (RBL) - ed construc	Average noise level LA _{eq} (period) based on Road Noise Policy ⁶			
	Morning shoulder	Day	Evening	Evening shoulder	Night	Day (15 hour)	Night (9 hour)
(ID M2)							
Front of 1111 Elizabeth Drive, Cecil Hills (ID M3)	49	58	54	48	42	70	66



5 Noise and vibration criteria for NSW

The EPA recommends management levels and goals when assessing construction noise and vibration. These are outlined in:

- Interim Construction Noise Guideline (ICNG) (DECC, 2009)
- Assessing Vibration: A Technical Guideline (DEC, 2006).

Relevant elements of these documents are summarised and discussed below.

5.1 Construction noise and assessment objectives

The ICNG provides guidelines for the assessment and management of construction noise. The ICNG focuses on applying a range of work practices to minimise construction noise impacts rather than focusing on achieving numeric noise levels.

The main objectives of the ICNG are to:

- Identify and minimise noise from construction works
- Focus on applying all 'feasible' and 'reasonable' work practices to minimise construction noise impacts
- Encourage construction during the recommended standard hours only, unless approval is given for works that cannot be undertaken during these hours
- Reduce time spent dealing with complaints at the project implementation stage
- Provide flexibility in selecting site-specific feasible and reasonable work practices to minimise noise impacts.

5.2 Construction noise assessment criteria

Construction noise assessment goals presented in the ICNG are referenced to NML for residential, sensitive land uses and commercial/ industrial premises.

5.2.1 Residential land use

Table 5-1 (reproduced from Table 2 of the ICNG) sets out the NMLs for residences.

The RBL is used as the basis for determining NMLs. The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours). The term RBL is described in detail in the *Noise Policy for Industry* (EPA, 2017). The calculated NML for each NCA is provided in Table 5-3.



Table 5-1: Residential NML guideline

Time of day	LAeq(15min)
Recommended standard construction hours Monday to Friday 7 am to 6 pm	Noise affected RBL + 10 dB
Saturday 8am to 6pmNo work on Sundays or public holidays	Highly noise affected 75 dB(A)
Outside recommended standard hours	Noise affected RBL + 5 dB

Note: Saturday 1pm to 6pm have been identified as standard work hours in accordance with NSW CoA E34.

5.2.2 Other sensitive land uses

Other sensitive land uses, such as schools and offices, typically find noise from construction to be disruptive when the properties are being used (such as during work and school times). Table 5-2 presents NML for sensitive land uses based on the principle that the characteristic activities for each of these land uses should not be unduly disturbed. The Construction Contractors will undertake consultation with noise sensitive land use occupants likely to be affected by noise from the Project to schedule construction activities and work hours to achieve a reasonable noise outcome.

The NML in Table 5-2 are 5 dB above the corresponding road traffic noise levels in the *Environmental Criteria for Road Traffic Noise* (EPA, 1999) (and the 'maximum' levels in the *NSW Industrial Noise Policy* (EPA, 2000) for commercial and industrial uses) to account for the variable and short-term nature of construction noise.

Table 5-2: Non-residential sensitive land uses noise management levels

Land use	Noise assessment location	NML LAeq(15min)³
Classrooms at schools and other educational institutions	Internal	45
Places of worship		
Passive recreation areas ¹	External	60
Active recreation areas ²	External	65
Industrial premises	External	75
Office, retail outlets	External	70

Notes: ¹ Passive recreation areas characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion.

² Active recreation areas are characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion.

³ Applies only when properties are being used



5.3 Working hours

5.3.1 Hours of work

In accordance with NSW CoA E34, work will be undertaken during the following hours:

- 7:00 am to 6:00 pm Monday to Friday
- 8:00 am to 6:00 pm Saturday (subject to prior approval from TfNSW for M12 West and Central)
- At no time on Sunday or public holidays.

In accordance with TfNSW Specification G1 (Job Specific Requirements), any application to work between 8:00am and 6:00pm on Saturdays (the allowable work hours on Saturdays identified in the Infrastructure Approval for M12 West and Central stages only) must be submitted to the TfNSW no later than 12:00pm on the Thursday immediately prior to the Saturday proposed to undertake work. The application must include the details of the work activities to be undertaken. Approval is at the discretion of TfNSW. Applications for work between 8:00am and 6:00pm on Saturdays will not be required for works that form part of the M12 East package.

The Construction Contractor will include construction timetabling, particularly for construction activities outside of standard hours, within their stage-specific CNVMP and stage-specific OOHW Protocol (refer Section 5.3.4).

5.3.2 Highly noise intensive works

As required by NSW CoA E35, except as permitted by an EPL, highly noise intensive works that result in an exceedance of the applicable NML at the same receiver must only be undertaken:

- Between 8:00 am to 6:00 pm Monday to Friday
- Between 8:00am to 1:00pm Saturday
- No work Sundays and public holidays.

Highly noise intensive works will be carried out in continuous blocks not exceeding three hours each, with a minimum respite of at least one hour between ceasing and recommencing each block of work. 'Continuous' includes any period during which there is less than a one hour respite between ceasing and recommencing the work.

Highly noise intensive works are defined as annoying under the Interim Construction Noise Guideline (DECC, 2009) and include:

- Use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work
- Grinding metal, concrete or masonry
- Rock drilling
- Line drilling
- Vibratory rolling
- Bitumen milling or profiling



- Jackhammering, rock hammering or rock breaking; and
- · Impact piling.

The Construction Contractors will confirm the highly noise intensive works required for the Project in the Construction Contractors' CNVMPs.

All conditions relating to construction hours outlined in the Project EPL will be complied with.

5.3.3 Variation to hours of work

Works outside of the standard construction hours identified in Section 5.3.1 may be undertaken in the following circumstances as permitted by NSW CoA E36:

- For the delivery of materials required by the NSW Police Force or other authority for safety reasons or
- 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.
- Work that causes:
 - LAeq(15 min) noise levels no more than 5 dB(A) above the rating background level at any residence in accordance with the ICNG, and
 - LAeq(15 min) noise levels no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s).
 - LAFmax(15 min) noise levels no more than 15 dB(A) above the rating background level at any residence during the night time period
 - Continuous or impulsive vibration values, measured at the most affected residence, that are no more than those for human exposure to vibration, specified for residences in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006) and
 - Intermittent vibration values, measured at the most affected residence, that are no more than those for human exposure to vibration, specified for residences in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006).
- By approval:
 - Where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or
 - Works which are not subject to an EPL that are approved under an Out-of-Hours Work
 Protocol as required by NSW CoA E37; or
 - Where negotiated agreements with directly affected residents and sensitive land uses have been reached.

On becoming aware of the need for emergency works, the Construction Contractor will notify the ER, the Planning Secretary and the EPA of the need for the emergency works. The Construction Contractor will use its best endeavours to notify all affected sensitive receivers of the likely impact and duration of the emergency works.



5.3.4 Out of hours work

This overarching CNVMP includes an Overarching OOHW Protocol in Appendix C which outlines how assessment, approval and management of Project OOHW <u>not</u> the subject of an EPL will occur. The Overarching OOHW Protocol has been prepared to address the requirements of NSW CoA E37. The Overarching OOHW Protocol will be submitted to the Planning Secretary for approval before commencement of the OOHW; amendments to the Overarching OOHW Protocol will be sent to the ER for consultation and then forwarded to the Planning Secretary for approval. The OOHW Protocol is also in accordance with the *Construction Noise and Vibration Guidelines* (Roads and Maritime, 2016) and TfNSW specifications.

The Construction Contractors will prepare and implement a stage-specific OOHW Protocol prior to commencement of construction. The Construction Contractors will need to detail the specific activities and timetabling that will be undertaken for the OOHW. The OOHW Protocol will be included in the Construction Contractor's CNVMP.

The OOHW Protocol will include, but not be limited to:

- The process for obtaining approval for OOHW
- The details to be provided in any OOHW application, including information on the nature and need and justification for activities to be conducted during the varied construction hours
- Requirements for consultation with potentially affected receivers and local Councils.

The Construction Contractors' OOHW Protocols will be consistent with the Overarching OOHW protocol and prepared in consultation with the ER.

5.4 Adopted construction noise management levels

The adopted Project construction NMLs for each NCA have been determined based on the measured noise levels described in Section 4.2.

For work during standard construction hours:

- The 'noise affected level' represents the point above which there may be some community reaction to noise. The noise affected level is calculated by adding 10 dB(A) to the RBL
- The 'highly noise affected level' represents the point above which there may be strong community reaction to noise. The ICNG specifies that the highly noise affected level is 75 dB(A).

Considering the possibility of work outside standard construction hours, additional Project construction NMLs for these times have also been determined.

For work outside standard construction hours, the construction NML is calculated by adding 5 dB(A) to the RBL. For assessing the potential for sleep disturbance, the RNP outlines a screening level of the prevailing RBL plus 15 dB(A).

The adopted Project construction NMLs and sleep disturbance screening criterion for residential receivers are provided in Table 5-3. As required by the Noise Policy for Industry (NPfI) when setting project construction NMLs, the evening NML should be no greater than the daytime NML. Likewise, the night-time NML should be no greater than the day or evening NML. Table 5-3 sets out the adopted Project construction NMLs for non-residential receivers.



Table 5-3: Construction NMLs and sleep disturbance screening criteria at residences

				NML LAeq(15	min) (dBA)				
NCA	Monitoring location		Standard construction (RBL + 10dB)		Out-of-hours (RBL + 5dB)				
		Day ⁷	Morning shoulder ⁸	Day ⁹	Evening ¹⁰	Evening shoulder ¹¹	Night ¹²	screening criteria (RBL + 15 dB)	
M12_NCA01	L01	55	50	50	49	49	45	55	
M12_NCA02	L01	55	50	50	49	49	45	55	
M12_NCA03	L05	49	44	44	44	44	40	50	
M12_NCA04	L03	64	59	59	53	53	42	52	
M12_NCA05	L02	46	41	41	41	41	39	49	
M12_NCA06	L05	49	44	44	44	44	40	50	

⁷ Daytime period is the standard construction hours of 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday

⁸ Morning shoulder period is 6:00 am to 7:00 am Monday to Friday. Where the morning shoulder RBL is higher than the daytime RBL, the daytime RBL was adopted

⁹ Daytime OOH period is 7:00 am to 8:00 am and 1:00 pm to 6:00 pm Saturday, and 8:00 am to 6:00 pm Sunday and Public Holidays

¹⁰ Evening period is 7:00 pm to 10:00 pm Monday to Friday and 6:00 pm to 10:00 pm Saturday, Sunday and Public Holidays

¹¹ Evening shoulder period is 6:00 pm to 7:00 pm Monday to Friday. Where the evening shoulder RBL is higher than the evening RBL, the evening RBL was adopted

¹² Night-time period is 10:00 pm to 6:00 am Monday to Friday, 10:00 pm to 7:00 am Saturday and 10:00 pm to 8:00 am Sunday and Public Holidays



				NML LAeq(15	min) (dBA)			
NCA	Monitoring location	Standard construction (RBL + 10dB)	truction Out-of-hours (RBL + 5dB)					Sleep disturbance screening criteria
		Day ⁷	Morning shoulder ⁸	Day ⁹	Evening ¹⁰	Evening shoulder ¹¹	Night ¹²	(RBL + 15 dB)
M12_NCA07	L06	44	39	39	39	39	36	46
M12_NCA08	L14	52	47	47	44	44	38	48
M12_NCA09	L07	50	45	45	41	41	36	46
M12_NCA10	L09	54	49	49	49	49	41	51
TfNSW_NCA16b	M2	58	47	53	50	47	43	53
TfNSW_NCA35	M3	68	54	63	59	53	47	57
M7_NCA13	NL12	67	56	62	58	54	50	60
M7_NCA14	NL11	54	47	49	48	46	44	54
M7_NCA15	NL11	54	47	49	48	46	44	54
M7_NCA16	NL11	54	47	49	48	46	44	54
M7_NCA17	NL9	75	60	70	62	56	50	60
M7_NCA18	NL18	57	52	52	52	52	52	66
M7_NCA19	NL18	57	52	52	52	52	52	66

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		NML LAeq(15min) (dBA)						
NCA	Monitoring location	Standard construction (RBL + 10dB)	nstruction Out-of-hours (RBL + 5dB)				Sleep disturbance screening criteria	
		Day ⁷	Morning shoulder ⁸	Day ⁹	Evening ¹⁰	Evening shoulder ¹¹	Night ¹²	(RBL + 15 dB)
M7_NCA20	NL8	77	61	72	65	58	50	60
M7_NCA21	NL6	70	59	65	61	57	52	62



5.4.1 Triggers for additional mitigation measures

In accordance with the CNVG, additional mitigation measures will be required to be implemented should the NML be exceeded. Table 5-4 (extracted Table C.1 of the CNVG) details the triggers for additional mitigation measures for air-borne noise. General construction noise impacts to M12 West and M12 Central

The data in the tables below is based on the M12 Motorway Amendment Report Appendix G Noise and Vibration (October 2020) and the TfNSW CNVG criteria.

Table 7-2 to Table 7-6 detail the predicted construction noise exceedances against the NML for each works period.

Table 5-4: Triggers for additional mitigation measures – airborne noise (TfNSW CNVG)

Perception	L _{Ae1(15min)} I	l airborne noise level eiver	Additional mitigation	Mitigation levels ²	
	dB(A) above RBL	dB(A) above NML	measures type ¹		
All hours					
75 dB(A) or greater			N, V, PC, RO	НА	
Standard Hours: Mon – Fri (7a	m – 6pm), Sat ((8am – 6pm), S	un/Pub Hol (Nil)		
Noticeable	5 to 10	0	-	NML	
Clearly audible	10 to 20	< 10	-	NML	
Moderately intrusive	20 to 30	10 to 20	N, V	NML+10	
Highly intrusive	> 30	> 20	N, V	NML+25	
OOHW Period 1: Mon – Fri (6p	om – 10pm), Sa	t (7am – 8am 8	6pm – 10pm), Sun/F	Pub Hol (8am-6pm)	
Noticeable	5 to 10	< 5	-	NML	
Clearly audible	10 to 20	5 to 15	N, R1, DR	NML+5	
Moderately intrusive	20 to 30	15 to 25	V, N, R1, DR	NML+15	
Highly intrusive	> 30	> 25	V, IB, N, R1, DR, PC, SN	NML+25	
OOHW Period 2: Mon – Fri (10pm – 7am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)					
Noticeable	5 to 10	< 5	N	NML	
Clearly audible	10 to 20	5 to 15	V, N, R2, DR	NML+5	
Moderately intrusive	20 to 30	15 to 25	V, IB, N, PC, SN, R2, DR	NML+15	



Perception	L _{Ae1(15min)} i	l airborne noise level eiver	Additional mitigation	Mitigation levels ²	
	dB(A) above RBL	dB(A) above NML	measures type ¹		
Highly intrusive	> 30	> 25	AA, V, IB, N, PC, SN, R2, DR	NML+25	
Notes (refer to detailed descriptions):	1. AA – Altern Accommodati		R1 – Respite Period 1 (unless otherwise permitted or required under an EPL)		
	V – Verificatio	n	PC – Phone calls		
	IB – Individua	l briefings	SN – Specific notifications		
	N – Notificatio	n	Perception – related to the level above RBL		
	R2 – Respite Period 2 (unless otherwise permitted or required under an EPL)		HA – Highly Affected (>75 dB(A) – applies to residences only)		
	DR – Duration Respites				
	2. NML – Nois Management				

Note: As per Attachment 2 in Appendix C Overarching Out-of-Hours Work Protocol

5.5 Construction vibration assessment objectives

The following construction vibration goals apply for the Project:

- For structural damage to heritage structures, the vibration limits set out in the German Standard *DIN 4150-3: Structural Vibration effects of vibration on structures*
- For damage to other buildings and/or structures, the vibration limits set out in the British Standard BS 7385-1:1990 Evaluation and measurement for vibration in buildings Guide for measurement of vibration and evaluation of their effects on buildings
- For human exposure, the acceptable vibration values set out in Assessing Vibration: A
 Technical Guideline (DEC, 2006).

5.6 Vibration criteria

Effects of ground vibration on buildings resulting from construction can be classified as follows:

- Human exposure disturbance to building occupants: vibration in which the occupants or users of the building are inconvenienced or possibly disturbed
- Effects on building contents vibration where the building contents may be affected
- Effects on building structures vibration in which the integrity of the building or structure itself may be prejudiced.



5.6.1 Human comfort vibration

Assessment of potential disturbance from tactile vibration on human occupants of buildings is made in accordance with *Assessing Vibration: A Technical Guideline* (DEC, 2006). The guideline provides criteria which are based on the British Standard *BS 6472-1992 Evaluation of human exposure to vibration in buildings (1-80Hz)*. Sources of vibration are defined as either 'continuous', 'impulsive' or 'intermittent':

- Continuous vibration from uninterrupted sources, e.g. machinery, steady road traffic, continuous construction activity
- Impulsive vibration up to three instances of sudden impact per monitoring period e.g. occasional dropping of heavy equipment, occasional loading and unloading
- Intermittent vibration such as from drilling, compacting or activities that will result in continuous vibration if operated continuously.

Maximum and preferred values for continuous and impulsive vibration are defined in Table 5-5. Application of the continuous and impulsive vibration criteria considers the level, duration of exposure, time of day, and varies for land uses.

Table 5-5: Continuous and impulsive vibration acceleration (m/s²) 1-80 Hz

	Assessment	Preferred	l Values	Maximum Values				
Location	period ¹	z-axis	x- and y- axis	z-axis	x- and y- axis			
Continuous vibration	Continuous vibration							
Critical areas ²	Day or night-time	0.0050	0.0036	0.010	0.0072			
Dacidonaca	Daytime	0.010	0.0071	0.020	0.014			
Residences	Night-time	0.007	0.005	0.014	0.010			
Offices, schools, educational institutions and places of worship	Day or night-time	0.020	0.014	0.040	0.028			
Workshops	Day or night- time	0.04	0.029	0.080	0.058			
Impulsive vibration								
Critical areas ²	Day or night-time	0.0050	0.0036	0.010	0.0072			
Decidence	Daytime	0.30	0.21	0.60	0.42			
Residences	Night-time	0.10	0.071	0.20	0.14			
Offices, schools, educational institutions and places of worship	Day or night-time	0.64	0.46	1.28	0.92			
Workshops	Day or night- time	0.64	0.46	1.28	0.92			

Notes: 1 Daytime is 7.00am to 10.00pm and night-time is 10.00pm to 7.00am



Intermittent vibration impact is assessed using vibration dose values (VDVs). The VDV method is more sensitive to peaks in the acceleration waveform and makes corrections to the criteria based on the exposure duration. The acceptable VDVs for intermittent vibration are defined in Table 5-6.

Table 5-6: Acceptable vibration dose values (m/s^{1.75}) for intermittent vibration.

Location	Daytime ¹		Night-time ¹	
	Preferred Values	Maximum Values	Preferred Values	Maximum Values
Critical areas ²	0.10	0.20	0.10	0.02
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Notes: ¹ Daytime is 7.00am to 10.00pm and night-time is 10.00pm to 7.00am

5.6.2 Structural damage

The standards by which building damage from construction-induced vibration is assessed are British Standard *BS 7385 Part 2 Evaluation and measurement of vibration in buildings* (BS 7385) and the German Standard *DIN 4150: Part 3 – 1999 Effects of Vibration on Structure* (DIN 4150-3) (DIN, 1999).

British Standard

BS 7385 is used as a guide to assess the likelihood of building damage from ground vibration. BS 7385 suggests levels at which 'cosmetic', 'minor' and 'major' categories of damage might occur, where the categories of structural damage are defined as:

- Cosmetic the formation of hairline cracks on drywall surfaces, or the growth of existing cracks in plaster or drywall surfaces; in addition, the formation of hairline cracks in mortar joints of brick/ concrete block construction
- Minor the formation of large cracks or loosening of plaster or drywall surfaces, or cracks through bricks/concrete blocks
- Major damage to structural elements of the building, cracks in supporting columns, loosening of joints, splaying of masonry cracks, etc.

The levels for structural damage outlined in the standard refer to non-continuous vibration sources and are considered 'safe limits' up to which no damage due to vibration effects are expected to occur for the various building types. Where vibration is continuous these levels may be reduced by up to 50% and additional assessment against the standard will be necessary.

² Such as hospital operating theatres or precision laboratories.

 $^{^{2}}$ Includes operating theatres, precision laboratories and other areas where vibration sensitive activities may occur.



BS 7385 is based on peak particle velocity and specifies damage criteria for frequencies within the range 4 to 250 Hz, being the range usually encountered in buildings. Table 5-7 sets out the BS 7385 criteria for cosmetic, minor and major damage.



Table 5-7: BS 7385 structural damage criteria

Group	Type of structure	Damage	Damage Peak component particle velocity ¹ (I			
		ievei	4 – 15 Hz	15 – 40Hz	≥40Hz	
	Reinforced or framed	Cosmetic	50	50	50	
1	structures Industrial and heavy commercial	MinorP2	100	100	100	
buildings	buildings	MajorP2	200	200	200	
	Un-reinforced or light framed structures Residential or light commercial type buildings	Cosmetic	15 - 20	20 - 50	50	
2		MinorP2	30 - 40	40 - 100	100	
		MajorP2	60 - 80	80 - 200	200	

Notes:

German Standard

DIN 4150-3 provides recommended maximum levels of vibration that reduce the likelihood of building damage caused by vibration and are generally recognised to be a more stringent criteria set than that of BS 7385. DIN 4150-3 presents the recommended maximum limits over a range of frequencies (Hz), measured in any direction, and at the foundation or in the plane of the uppermost floor of a building or structure.

Where heritage structures are impacted, DIN 4150-3 vibration criteria will be applied. The criteria applicable to heritage buildings are identified in Table 5-8. Based on DIN 4150-3, a measured value exceeding those listed in Table 5-8 will not necessarily lead to damage if it is significantly exceeded, however, further investigations may be necessary.

In accordance with NSW CoA E43, a heritage specialist will be engaged throughout the Project to provide TfNSW and its Construction Contractors with advice on methods and locations for installing equipment used for vibration, movement and noise monitoring of heritage-listed structures.

Table 5-8: DIN 4150-3 vibration guidelines for heritage buildings

	Guideline values for vibration velocity (mm/s)					
Type of structure	Vibration at	t the foundation	Vibration at the horizontal			
	1 - 10 Hz	10 - 50 Hz	50 - 100 Hz ¹	plane of the highest floor at all frequencies		
Heritage buildings	3	3 - 8	8 - 10	8		

Notes: ¹At frequencies above 100 Hz the values given in this column may be used as minimum values.

¹ Peak Component Particle Velocity is the maximum Peak particle velocity in any one direction (x, y, z) as measured by a tri-axial vibration transducer.

² Minor and major damage criteria established based on BS 7385 Part 2 (1993) Section 7.4.2



Jemena Assets

Jemena guideline 'Designing, constructing and operating assets near Jemena gas pipelines' (GAS-960-GL-PL-001) identifies a maximum level of vibration of 20 mm/second which is to be measured at the nearest surface of the buried pipeline. The Construction Contractor will set a trigger alert where vibration monitoring identifies vibration at 15mm/s. At this point, construction activities will cease to minimise impact on Jemena assets. Alternative construction methods will be investigated to ensure vibration limits do not exceed 20 mm/second.

5.6.3 Safe working distances

Where vibration intensive plant such as rock breakers and vibratory rollers are used, vibration must be managed to minimise disturbance to building occupants and to avoid damage to buildings and other structures. Table 5-9 indicates the safe working distances recommended by the CNVG for typical items of vibration intensive plant that must be complied with unless otherwise approved by TfNSW.

Table 5-9: Safe working distances for vibration intensive plant (TfNSW 2019)

		\$	Safe working distan	ce
Plant item	Rating/description	Cosmetic damage (British Std 7385) – Light framed structures	Cosmetic damage (DIN 4150) Heritage and other sensitive structures	Human response (EPA's vibration guideline)
Vibratory roller	<50 kN (typically 1-2 t) <100 kN (typically 2-4 t) <200 kN (typically 4-6 t) <300 kN (typically 7-13 t) >300 kN (typically 13- 18 t) >300 kN (> 18 t)	5 m 6 m 12 m 15 m 20 m 25 m	14 m 16 m 33 m 41 m 54 m 68 m	15 m to 20 m 20 m 40 m 100 m 100 m 100 m
Small hydraulic hammer	300 kg – 5 to 12 t excavator	2 m	5 m	7 m
Medium hydraulic hammer	900 kg – 12 to 18t excavator	7 m	19 m	23 m
Large hydraulic hammer	1600 kg – 18 to 34 t excavator	22 m	60 m	73 m
Vibratory pile driver	Sheet piles	20 m	50 m	100 m
Pile boring	≤800 mm	2 m (nominal)	5 m	7 m
Jackhammer	Hand held	1 m (nominal)	2 m	3 m

The safe working distances presented in Table 5-9 are indicative and will vary depending on the item of plant (particularly its power rating) and local geotechnical conditions. The cosmetic damage



thresholds apply to typical buildings under typical geotechnical conditions and vibration monitoring is recommended at specific sites. Where structures are more sensitive such as heritage items, more stringent conditions may be applicable and will be considered individually by the Construction Contractor. A heritage specialist (built structures) will be engaged by the Construction Contractor to provide advice on methods and locations for installing equipment used for vibration, movement and noise monitoring of heritage-listed structures in accordance with NSW CoA E43.

In relation to human response, the safe working distances relate to continuous vibration. For most construction activities, vibration emissions are intermittent and higher vibration levels over shorter periods are acceptable. Additional assessment will be undertaken by the Construction Contractor where the human response criteria are exceeded.



6 Environmental aspects and impacts

6.1 Construction activities

The Project will involve a range of activities incorporating various heavy machinery, plant and equipment that will operate in a number of locations across the Project. In order to assess the level of potential impact on noise and vibration sensitive receivers, the broad categories of construction activity likely to interact with these receivers include:

- · Site establishment and decommissioning
- Construction compounds (carparks, office buildings, laydown areas)
- Clearing and grubbing
- Demolition
- Utilities and drainage
- Earthworks
- Material haulage
- Concrete batching
- · Crushing and screening
- Road works
- Bridgeworks (including piling)
- · Paving and concrete saw cutting
- Finishing works (road furnishing and landscaping).

6.2 Environmental impacts

The potential for noise and vibration impacts on sensitive receivers or structures will depend on a number of factors including:

- Type of equipment in use
- Number of equipment simultaneously in use
- Ground condition
- Topography and other physical barriers
- Proximity to sensitive receivers
- Condition of sensitive receivers
- · Hours/duration of construction works
- Proximity of heavy traffic areas.

Relevant aspects and the potential for related impacts have been considered in a risk assessment provided in Appendix A2 of the OCEMP.

Modelling of noise and vibration shows that impacts attributable to the Project are anticipated, this is detailed in Section 7 of this Plan. Section 8 of this Plan provides a suite of mitigation measures



that will be implemented to avoid or minimise noise and vibration impacts on the receiving community and/or built environment.

6.3 Cumulative impacts, respite and construction fatigue

The multitude of other projects in the area including The Northern Road, the Western Sydney International Airport, work associated with the Aerotropolis, Sydney Metro – Western Sydney Airport and other residential and retail developments may lead to construction and consultation fatigue for the local community including the M7 Widening Project.

Although the M7 Widening project is considered a separate SSI, it is being delivered as an integrated Project with the M12 East stage (M7-M12 Integration Project) in which works will be delivered concurrently. Cumulative noise impacts associated with the M7-M12 Integration Project will be considered in the Construction Contractor Construction Environmental Management Plan for M12 East.

Interagency communication between government departments undertaking work in the area is required to manage the cumulative impacts with the aim of combining messages when possible and minimising impacts to the local community. Several key interface meetings have been established to coordinate construction activities:

- 1. Elizabeth Drive Construction Coordination Group meet on a fortnightly basis to discuss upcoming work schedules, OOHW, program efficiencies, sharing of information, etc
- 2. Sydney Metro Western Sydney Airport Communication Interface Coordination Group who meet on a fortnightly basis. This group includes communications specialists whose goal it is to ensure the major projects working in the area coordinate messages and work activities if possible, and to manage and plan for cumulative impacts that are likely to be sensitive to the community during the construction phase of the projects
- Regular interface meetings with other project stakeholders such as WSIA, Sydney Metro Western Sydney Airport, Sydney Water and other major SSD projects within the vicinity of the M12 Project
- 4. Once contracts are awarded, TfNSW will facilitate coordination meetings between M12 East, West and Central construction contractors as required.

The Construction Contractor will ensure works will be scheduled with the aim of minimising concurrent works near sensitive receivers. This will include:

- Coordination between project teams and other CSSI, SSI and SSD projects that are being constructed nearby
- Rescheduling of work to provide respite to impacted noise sensitive land user(s) so that respite is achieved during OOHW
- Consideration to the provision of alternative respite or mitigation to impacted noise sensitive land users where OOHW respite as per NSW CoA E47 cannot be provided.

The ER will be informed of decisions made in relation to respite or mitigation for OOHW. The implementation of respite and OOHW management measures as per NSW CoA E45 have been detailed in Section 8 and will be managed in accordance with the Out of Hours Work Protocol (Appendix C).

Construction fatigue will be managed in accordance with the OCS, which includes a Construction Fatigue Protocol to minimise impacts associated with construction fatigue. The Protocol will include consideration of noise attenuation and restriction of OOHW or use of noise intensive equipment where reasonable and feasible.



7 Construction noise and vibration assessment

A range of plant and equipment will be required to undertake activities associated with the Project. A summary of anticipated construction scenarios and predicted noise and vibration levels is provided in the sections below.

7.1 Construction activities

Table 7-1 provides a summary of the Project construction phases and description of activities anticipated to be used for the phase.

Table 7-1: Construction scenarios and associated activities

Scenario reference no.	Construction scenario	Description
1a	Ancillary facility establishment/ decommissioning – Peak impact	Before construction begins, the ancillary facilities will need to be prepared to allow construction works to occur. The works will vary depending on location and the existing conditions but could include: • Minor clearing
1b	Ancillary facility establishment/ decommissioning – Typical impact	 Minor earthworks Installation of office accommodation Utilities Amenities Secure perimeter fencing, including visual screening of construction ancillary facilities where necessary Highly noise intensive works will be required at certain times and will include the use of excavators and front-end loaders.
2a	Ancillary facilities – Operation	The ancillary facilities will generally comprise: Temporary buildings (generally prefabricated) including offices
2b	Ancillary facilities – Stockpiling	and meeting rooms, amenities and first aid facilities (the size and number of office facilities at the main ancillary facilities will be greater than at the secondary ancillary facilities)
2c	Ancillary facilities – Batching plant	Hardstand parking areas with sufficient space to accommodate the numbers of construction workers expected at any site
2d	Ancillary facilities – Crushing activities	 Materials laydown, storage and handling areas, including purpose built temporary structures as required Batching plants are currently proposed to be located at AF 2, AF 3, AF 4 and AF 10. The location of the batching plant has been assumed to be all of AF 10 and in the centre of AF 2 and AF 3. Crushing, grinding and screening operations are currently proposed to be located at AF 1, AF 2 and AF 10. The site layout of all ancillary facilities is considered indicative and will be confirmed as the project progresses.



Scenario reference no.	Construction scenario	Description
		Bridge construction support areas
		Workshops with appropriate safety and environmental controls for servicing plant and equipment.
		The operation of all ancillary sites has been assessed for 24/7 operation. It should be noted that the assessment does not include any source mitigation or localised screening which will be investigated by the Construction Contractors following confirmation of the site layout.
3a	Utilities and drainage - including relocation of existing - Peak impact	The Project will require the construction of new drainage infrastructure and alterations to existing drainage. Construction of drainage works will involve localised excavation, compaction and installation of drainage pipes and pits, and construction of table drains and temporary construction sediment basins. High noise impact works will be required at certain times and will include the use
3b	Utilities and drainage - including relocation of existing - Typical impact	of rock-breakers.
4a	Demolition - bridges and buildings (including breaker)	Certain buildings and structures within the construction footprint will require demolition and removal where they are not proposed to be used as ancillary facilities during construction. This includes:
4b	Demolition - bridges and buildings (no	Buildings, sheds or farm infrastructure that fall within the construction footprint.
	breaker)	A bridge crossing South Creek on private property.
		Peak noise impact works will be required at certain times and will include the use of rock-breakers.
5a	Clearing - Peak impact	Vegetation and topsoil will be stripped before earthworks are carried out. This is likely to involve:
5b	Clearing - Typical	Removal of vegetation
	impact	Topsoil stripping
		Peak noise impact works will be required at certain times and will include the use of chainsaws and chippers.
6a	Earthworks - Peak	Earthworks will be required along the entire length of the project for:
6b	impact Earthworks -	Areas of new cut and fill along the construction footprint, including at all interchanges
OD	Typical impact	Construction of retaining walls
		Cut and fill or preparation of site for construction of all bridges.
		Peak noise impact works will be required at certain times and will include the use of dozers or graders.



Scenario reference no.	Construction scenario	Description
6c	Earthworks - onsite truck haulage	Onsite haulage will be required to move spoil between areas of the site as required. These activities have the potential to cause impacts as the truck travel between the various sites within the construction footprint.
7a	Bridge works - Peak impact (including piling)	Construction of the bridges will generally involve: Construction of foundations (piling) Construction of bridge piece
7b	Bridge works - Typical impact	 Construction of bridge piers Construction of bridge abutments and spill-throughs where required
7c	Bridge works - concrete works	 Installation of pre-cast concrete planks/girders and barriers Installation of the deck
7d	Bridge works - girder lifts over existing roads	Installation of throw screens where required. For the proposed bridge lifts occurring over existing roads, it is likely that these activities will be required to occur outside of standard hours to minimise traffic disruption.
8a	Road works - concrete works	Road works will generally include the surfacing and concrete/asphalt works associated with the construction of the road surface. Road works involving the tie-in works to existing roads at the M7
8b	Road works - Typical impact	Interchange, Elizabeth Drive at Airport Road, Wallgrove Road will likely be required to occur outside of standard hours. Additionally, works around the private access road along Luddenham Road, bike
8c	Road works - tie-in works to existing roads	path connection into Elizabeth Drive near Mamre Road and utility access road will likely be required to occur outside of standard hours. Peak noise impact works will be required at certain times and will include the use of concrete saws.
9a	Signage, lighting and landscaping - installation and finishing works	Finishing works are required to complete the project and include activities such as line marking, installing signs, etc Installation and finishing work generally have no requirement for peak noise impact equipment.

7.2 Construction noise impacts

A summary of the potential impacts to receivers for each NCA from standard hours (daytime) and out-of-hours construction scenarios are presented in General construction noise impacts to M12 West and M12 Central

The data in the tables below is based on the M12 Motorway Amendment Report Appendix G Noise and Vibration (October 2020) and the TfNSW CNVG criteria.

Table 7-2 to Table 7-6 (M12 West and Central) and Noise exceedances for NCAs assessed as part of the M12 EAD are shown in Tables 7-7 to 7-11. The noise exceedances for NCAs as assessed as part of the M7 Widening EAD are shown in Table 7-12. As a result of these separate assessments, the exceedances for these NCAs are presented separately in Table 7-7 to Table 7-11 (M12 East).



The construction impacts presented are based on representative worst-case noise construction scenarios assuming all equipment operates concurrently and that equipment is located at the closest point to receivers specific to the Project. The tables provide an assessment against Table C.1 of the CNVG (represented as Table 5-4 in this Plan) and demonstrates the requirement (or not) for additional mitigation measures.

The construction noise modelling undertaken for the assessment identified several sensitive receivers as being subjected to levels that exceed the Highly Noise Affected criteria (>75 dB(A)). Appendix G of the Amendment Report: Noise and vibration updated technical report, provides a detailed prediction of construction noise at sensitive receivers.

The Construction Contractors will develop stage specific construction scenarios, timings, offset distances, equipment and identify concurrent / overlapping activities. The Construction Contractors will re-assess all construction noise and vibration impacts in accordance with the ICNG and CNVG and describe the construction impacts and the necessary noise, vibration and management mitigation measures which will be implemented in the Construction Contractors' CNVMPs.

Activities that are predicted to exceed the NMLs are listed in Table 5-3 and Table 5-4, and the requirements of NSW CoA E36 will only occur in accordance with the EPL. Generally, construction work will be undertaken in standard construction hours whenever practicable. Some activities, such as bridgeworks, paving and operation of ancillary facilities may occur outside of standard of hours in accordance with the requirements of NSW CoA E36 and the EPL.



7.2.1 General construction noise impacts to M12 West and M12 Central

The data in the tables below is based on the M12 Motorway Amendment Report Appendix G Noise and Vibration (October 2020) and the TfNSW CNVG criteria.

Table 7-2: Predicted construction noise exceedances morning shoulder (6am to 7am Monday to Friday) at residential receivers for M12 West and M12 Central

						Nois	e Catc	hment	Area		
Period	ID	Scenario	Activity	NCA03	NCA04	NCA05	NCA06	NCA07	NCA08	NCA09	NCA10
	1a	Ancillary facility	Peak impact								
	1b	establishment	Typical impact								
	2a		Operation								
	2b	Ancillary facilities operations	Stockpiling								
	2c	Andilary facilities operations	Batching plant								
	2d		Crushing works								
	3a	Utilities and drainage	Peak impact								
d 2)	3b Utilities and drainage	Typical impact									
Morning Shoulder (OOHW Period 2)	4a	Demolition	Peak impact								
	4b	Demontori	Typical impact								
	5a	Clearing	Peak impact								
0	5b	Clearing	Typical impact								
lde	6a		Peak impact								
hou	6b	Earthworks	Typical impact								
ning S	6c		Onsite truck haulage								
Mor	7a		Peak impact								
	7b	Bridge works	Typical impact								
	7c	bridge works	Concrete works								
	7d		Girder lifts								
	8a		Concrete works								
		Road works	Typical works								
	8c		Tie-in works								
	9a	Signage, lighting and landscaping									

Legend:

Receiver Perception (dB above NML):

- Noticeable (<5 dB) Clearly Audible (5dB to 15dB) Moderately Intrusive (15dB to 25dB)
- Highly Intrusive (>25dB)



Table 7-3: Predicted construction noise exceedances daytime (7am to 6pm Monday to Friday, and 8am to 6pm on Saturdays) at residential receivers for M12 West and M12 Central

						Nois	e Catc	hment	Area		
Period	ID	Scenario	Activity	NCA-03	NCA-04	NCA-05	NCA-06	NCA-07	NCA-08	NCA-09	NCA-10
	1a	Ancillary facility	Peak impact								
	1b	establishment	Typical impact								
	2a		Operation								
	2b	Ancillary facilities	Stockpiling								
	2c	operations	Batching plant								
	2d		Crushing works								
	3a	Litilities and drainage	Peak impact								
	3b	Utilities and drainage	Typical impact								
ırs	4a	Demolition	Peak impact								
된	4b	Demoillion	Typical impact								
Standard Daytime Hours	5a	Clearing	Peak impact								
ayt	5b	Clearing	Typical impact								
rd	6a		Peak impact								
nda	6b	Earthworks	Typical impact								
Sta	6c		Onsite truck haulage								
	7a		Peak impact								
	7b	Bridge works	Typical impact								
	7c	Bridge works	Concrete works								
	7d		Girder lifts								
	8a		Concrete works								
	8b	Road works	Typical works								
	8c										
	9a Signage, lighting and landscaping										
Lege	nd.										

Receiver Perception (dB above NML):

● Noticeable (<5 dB) ● Clearly Audible (5dB to 15dB) ● Moderately Intrusive (15dB to 25dB)



Table 7-4: Predicted construction noise exceedances evening shoulder (6pm to 7pm Monday to Friday) at residential receivers for M12 West and M12 Central

						Nois	e Catc	hment	Area		
Period	ID	Scenario	Activity	NCA-03	NCA-04	NCA-05	NCA-06	NCA-07	NCA-08	NCA-09	NCA-10
	1a	Ancillary facility	Peak impact								
	1b	establishment	Typical impact								
	2a		Operation								
	2b	Ancillary facilities	Stockpiling								
	2c	operations	Batching plant								
	2d		Crushing works								
	За	Utilities and drainage	Peak impact								
€	3b	Ounties and drainage	Typical impact								
riod	4a	Demolition	Peak impact								
/ Pe	4b	Bomondon	Typical impact								
) HC	5a	Clearing	Peak impact								
Ö.	5b	Olodinig	Typical impact								
ılde	6a		Peak impact								
Shou	6b	Earthworks	Typical impact								
Evening Shoulder (OOHW Period 1)	6c		Onsite truck haulage								
ĒVE	7a		Peak impact								
	7b	Bridge works	Typical impact								
	7c	Bridge Works	Concrete works								
	7d		Girder lifts								
	8a		Concrete works								
	8b	Road works	Typical works								
	8c		Tie-in works								
	9a	Signage, lighting and landsca	aping								

Receiver Perception (dB above NML):

- Noticeable (<5 dB) Clearly Audible (5dB to 15dB) Moderately Intrusive (15dB to 25dB)
- Highly Intrusive (>25dB)



Table 7-5: Predicted construction noise exceedances evening (7pm to 10pm Monday to Friday, 6pm to 10pm Saturday, Sunday and Public Holidays) at residential receivers for M12 West and M12 Central

						Nois	e Catc	hment	Area		
Period	ID	Scenario	Activity	NCA-03	NCA-04	NCA-05	NCA-06	NCA-07	NCA-08	NCA-09	NCA-10
	1a	Ancillary facility	Peak impact								
	1b	establishment	Typical impact								
	2a		Operation								
	2b	Ancillary facilities	Stockpiling								
	2c	operations	Batching plant								
	2d		Crushing works								
	3a	I liliting and during an	Peak impact								
	3b	Utilities and drainage	Typical impact								
	4a	Demolition	Peak impact								
d 1)	4b	Demolition	Typical impact								
erio	5a	Ola a via v	Peak impact								
₽	5b	Clearing	Typical impact								
OH	6a		Peak impact								
) 6ı	6b	Earthworks	Typical impact								
Evening (OOHW Period 1)	6c		Onsite truck haulage								
	7a		Peak impact								
	7b	Duides weeks	Typical impact								
	7c	Bridge works	Concrete works								
	7d		Girder lifts								
	8a		Concrete works								
	8b	Road works	Typical works								
	8c		Tie-in works								
	9a	Signage, lighting and landsca	aping								

Receiver Perception (dB above NML):

● Noticeable (<5 dB) ● Clearly Audible (5dB to 15dB) ● Moderately Intrusive (15dB to 25dB)



Table 7-6: Predicted construction noise exceedances night time (10pm to 6am Monday to Friday, 10pm to 7am on Saturdays and 10pm to 8am on Sundays and Public Holidays) at residential receivers for M12 West and M12 Central

				Noise Catchment Area								
Period	ID	Scenario	Activity		NCA-04	NCA-05	NCA-06	NCA-07	NCA-08	NCA-09	NCA-10	
	1a	Ancillary facility	Peak impact									
	1b	establishment	Typical impact									
	2a		Operation									
	2b	Ancillary facilities	Stockpiling									
	2c	operations	Batching plant									
	2d		Crushing works									
	3a	Litilities and drainage	Peak impact									
	3b	Utilities and drainage	Typical impact									
2	4a	Demolition	Peak impact									
riod	4b	Demolition	Typical impact									
V Pe	5a	Classins	Peak impact									
OHV	5b	Clearing	Typical impact									
O) e	6a		Peak impact									
tim	6b	Earthworks	Typical impact									
Night-time (OOHW Period 2)	6c	Zaramente	Onsite truck haulage									
	7a		Peak impact									
	7b	Deiderarrado	Typical impact									
	7c	Bridge works	Concrete works									
	7d		Girder lifts									
	8a		Concrete works									
	8b	<u> </u>	Typical works									
	8c		Tie-in works									
	9a Signage, lighting and landscaping		aping									

Receiver Perception (dB above NML):

- Noticeable (<5 dB) Clearly Audible (5dB to 15dB) Moderately Intrusive (15dB to 25dB)
- Highly Intrusive (>25dB)



7.2.2 General construction noise impacts to M12 East Package

The Construction Contractor will develop stage specific construction scenarios, timings, offset distances, equipment and identify concurrent / overlapping activities using a noise and vibration tool (Gatewave). Using this tool, the Construction Contractor will re-assess all construction noise and vibration impacts in accordance with the ICNG and CNVG. Construction impacts and the necessary noise, vibration and management mitigation measures which will be implemented are described in the M7- M12 Integration Project CVNMP.

Generally, construction work will be undertaken in standard construction hours whenever practicable. Some activities such as utility work, concrete pours, bridge work, road work and operation of ancillary facilities may occur outside of standard of hours in accordance with the requirements of NSW M12 CoA E36 and/or the EPL, as relevant.

The NCAs which are impacted by the M12 East works have been defined and assessed separately in both the M12 EAD and the M7 Widening EAD. Noise exceedances for NCAs assessed as part of the M12 EAD are shown in Tables 7-7 to 7-11. The noise exceedances for NCAs as assessed as part of the M7 Widening EAD are shown in Table 7-12. As a result of these separate assessments, the exceedances for these NCAs are presented separately.



Table 7-7: Predicted construction noise exceedances morning shoulder (6am to 7am Monday to Friday) at residential receivers for M12 East

					Noise (Catchme	nt Area	
Period	ID	Scenario	Activity	NCA01	NCA02	NCA03	NCA04	NCA05
	1a	Ancillary facility	Peak impact					
	1b	establishment	Typical impact					
	2a	Ancillary facilities operations	Operation					
	2b	Andiliary facilities operations	Stockpiling					
	3a	Utilities and drainage	Peak impact					
	3b	Officies and drainage	Typical impact					
Morning Shoulder (OOHW Period 2)	4a	Domolition	Peak impact					
erio	4b	Demolition	Typical impact					
₹	5a	Clearing	Peak impact					
OOH	5b		Typical impact					
er ((6a		Peak impact					
pIno	6b	Earthworks	Typical impact					
She	6c		Onsite truck haulage					
ning	7a		Peak impact					
Mor	7b	5	Typical impact					
	7c	Bridge works	Concrete works					
	7d		Girder lifts					
	8a		Concrete works					
	8b	Road works	Typical works					
	8c		Tie-in works					
	9a	Signage, lighting and landscapi	ing					

Receiver Perception (dB above NML):

● Noticeable (<5 dB) ● Clearly Audible (5dB to 15dB) ● Moderately Intrusive (15dB to 25dB)



Table 7-8: Predicted construction noise exceedances daytime (7am to 6pm Monday to Friday, and 8am to 6pm on Saturdays) at residential receivers for M12 East

					Noise (Catchme	nt Area	
Period	ID	Scenario	Activity	NCA01	NCA02	NCA03	NCA04	NCA05
	1a	Ancillary facility	Peak impact					
	1b	establishment	Typical impact					
	2a	Ancillary facilities operations	Operation					
	2b	Ancillary facilities operations	Stockpiling					
	3a	Litilities and drainage	Peak impact					
	3b	Utilities and drainage	Typical impact					
	4a	Domolition	Peak impact					
ırs	4b	Demolition	Typical impact					
Standard Daytime Hours	5a	Clearing	Peak impact					
time	5b	Clearing	Typical impact					
Day	6a		Peak impact					
ard	6b	Earthworks	Typical impact					
and	6c		Onsite truck haulage					
S	7a		Peak impact					
	7b	Duides wales	Typical impact					
	7c	Bridge works	Concrete works					
	7d		Girder lifts					
	8a		Concrete works					
	8b	8b Road works	Typical works					
	8c		Tie-in works					
	9a Signage, lighting and landscap	ing						

Receiver Perception (dB above NML):

● Noticeable (<5 dB) ● Clearly Audible (5dB to 15dB) ● Moderately Intrusive (15dB to 25dB)



Table 7-9: Predicted construction noise exceedances evening shoulder (6pm to 7pm Monday to Friday) at residential receivers for M12 East

				Noise Catchment Area							
Period	ID	Scenario	Activity	NCA01	NCA02	NCA03	NCA04	NCA05			
	1a	Ancillary facility	Peak impact								
	1b	establishment	Typical impact								
	2a	Ancillary facilities operations	Operation								
	2b	Anomary racinities operations	Stockpiling								
	3a	Utilities and drainage	Peak impact								
	3b	Offices and drainage	Typical impact								
d 1)	4a	Demolition	Peak impact								
erio	4b	Demondon	Typical impact								
Evening Shoulder (OOHW Period 1)	5a	Clearing	Peak impact								
ЮН	5b	Clearing	Typical impact								
er (C	6a		Peak impact								
pInd	6b	Earthworks	Typical impact								
Sho	6c		Onsite truck haulage								
jing	7a		Peak impact								
Ever	7b	Bridge works	Typical impact								
	7c	bridge works	Concrete works								
	7d		Girder lifts								
	8a		Concrete works								
	8b	Road works	Typical works								
	8c		Tie-in works								
	9a	Signage, lighting and landscapi	ing								

Receiver Perception (dB above NML):

● Noticeable (<5 dB) ● Clearly Audible (5dB to 15dB) ● Moderately Intrusive (15dB to 25dB)



Table 7-10: Predicted construction noise exceedances evening (7pm to 10pm Monday to Friday, 6pm to 10pm Saturday, Sunday and Public Holidays) at residential receivers for M12 East

					Noise (Catchme	nt Area	
Period	ID	Scenario	Activity	NCA01	NCA02	NCA03	NCA04	NCA05
	1a	Ancillary facility	Peak impact					
	1b	establishment	Typical impact					
	2a	Ancillary facilities operations	Operation					
	2b	Ancillary facilities operations	Stockpiling					
	3a	Litilities and drainage	Peak impact					
	3b	Utilities and drainage	Typical impact					
	4a	Domolition	Peak impact					
d 1)	4b	- Demolition	Typical impact					
Evening (OOHW Period 1)	5a	Clearing	Peak impact					
N P	5b	Clearing	Typical impact					
OH	6a		Peak impact					
) gi	6b	Earthworks	Typical impact					
enin	6c		Onsite truck haulage					
Ā	7a		Peak impact					
	7b	Duides wales	Typical impact					
	7c	Bridge works	Concrete works					
	7d		Girder lifts					
	8a		Concrete works					
	8b	8b Road works	Typical works					
	8c		Tie-in works					
	9a Signage, lighting and landscapi	ing						

Receiver Perception (dB above NML):

● Noticeable (<5 dB) ● Clearly Audible (5dB to 15dB) ● Moderately Intrusive (15dB to 25dB)



Table 7-11: Predicted construction noise exceedances night time (10pm to 6am Monday to Friday, 10pm to 7am on Saturdays and 10pm to 8am on Sundays and Public Holidays) at residential receivers for M12 East

					Noise (Catchme	nt Area	
Period	ID	Scenario	Activity	NCA01	NCA02	NCA03	NCA04	NCA05
	1a	Ancillary facility	Peak impact					
	1b	establishment	Typical impact					
	2a	Ancillary facilities operations	Operation					
	2b	Ancillary facilities operations	Stockpiling					
	3a	Litilities and drainage	Peak impact					
	3b	Utilities and drainage	Typical impact					
	4a	Demolition	Peak impact					
2)	4b	Demolition	Typical impact					
riod	5a	Clearing	Peak impact					
/ Pel	5b	Clearing	Typical impact					
Night (OOHW Period 2)	6a		Peak impact					
0)	6b	Earthworks	Typical impact					
light	6c		Onsite truck haulage					
Z	7a		Peak impact					
	7b	Duides wales	Typical impact					
	7c	Bridge works	Concrete works					
	7d		Girder lifts					
	8a		Concrete works					
	8b	Road works	Typical works					
	8c		Tie-in works					
	9a	Signage, lighting and landscapi	ing					

Receiver Perception (dB above NML):

● Noticeable (<5 dB) ● Clearly Audible (5dB to 15dB) ● Moderately Intrusive (15dB to 25dB)



Noise levels from construction activities have been modelled and compared to applicable NMLs for residential receivers for the M7 Widening NCAs. In general, the greatest number of exceedances of applicable noise management levels in each NCA occurred outside standard construction hours (Table 7-12).

Table 7-12: Approximate number of residential buildings where noise levels may exceed NMLs for all construction scenarios for M7 Widening

	Highly noise	constr	dard ruction urs	Ou		Most	
Scenario	affected (>75dBA)	Above NML	11- 20dB above NML	Above NML	1-5 dB above NML	>5 dBA above NML	impacted NCAs
Site establishment and enabling works	67	1220	198	3840	3005	832	NCA9 and NCA31
Earthworks	179	2640	779	4280	3906	374	NCA10, NCA13, NCA26, NCA30-32
Bridge works	3	960	96	2360	2038	320	N/A
Drainage works	N/A	40	37	730	300	429	N/A
Pavement works	9	330	16	2760	1677	1080	NCA31
Noise wall works	66	410	89	1310	916	389	NCA10, NCA13, NCA26, NCA28, and NCA31
Finishing works	36	530	62	2890	1827	1063	NCA9 and NCA31



7.2.3 Sensitive Receivers

The noise assessment determined there will be a number of highly noise affected (subject to noise levels of 75 dBA or greater) residential receivers as outlined in Table 7-13.

Table 7-13: Number of predicted highly noise affected residential receivers

Scenario	Activity	NCA01	NCA02	NCA03	NCA04	NCA05	NCA06	NCA07	NCA08	NCA09	NCA10
Ancillary facility establishment	Peak impact						1				
Utilities and drainage	Peak impact		7		2		1	1			
Clearing	Peak impact		4		1		1	1			
Earthworks	Peak impact		3		1		1	1			
Road works	Peak impact						1				

There are several categories of 'other' sensitive receivers in the study area, including educational facilities, places of worship and outdoor areas.

The predicted NML exceedances for 'other' sensitive receivers show that:

- Exceedances at 'other' sensitive receivers are limited to receivers in NCA01, NCA02, NCA04 and NCA05
- The closest School (Irfan College) is located in NCA04. As presented in the Amendment Report it is likely to be subject to 'high impacts' during worst-case scenarios when noise intensive equipment is being used during construction.
- A minor 1 dB exceedance is predicted at Saints Peter and Paul Assyrian Church of the East located in NCA01 and at the Head Start Long Day Care Centre in Cecil Hills, located in NCA02
- Minor exceedances of up to 7 dB are predicted at two outdoor sensitive receiver areas (Kemps Creek Sporting and Bowling Club and Western Sydney Parklands) adjacent to the project in NCA04 and NCA05
- 'Other' sensitive receivers in the study area are not expected to be impacted by construction of the project.

The worst-case noise levels and the impacts on 'other' sensitive receivers will only be apparent for relatively short durations of the works.



The predicted construction noise impacts in each NCA for commercial receivers showed that:

- Minor impacts are seen in NCA05 during the 'Peak impact' scenarios for Ancillary facility establishment, Utilities and drainage, Clearing and Earthworks
- The worst-case impacts are seen in the 'Peak impact' scenarios, which is due to the use of noise intensive equipment. Noise levels and exceedances during the 'Typical impact' works do not exceed the noise management levels.
- Other NCAs either have no commercial receivers or they are sufficiently distant from the construction footprint to be compliant with the noise goals
- No commercial receivers are predicted to have moderate or peak impacts.

7.2.4 Ancillary facility and stockpile operation (including access)

Temporary ancillary facilities required for the Project will include compounds and laydown areas. The locations of the ancillary facilities assessed in the EAD are shown in Figure 7-1.

The compounds and ancillary facilities will accommodate a range of activities, plant and equipment including, but not limited to:

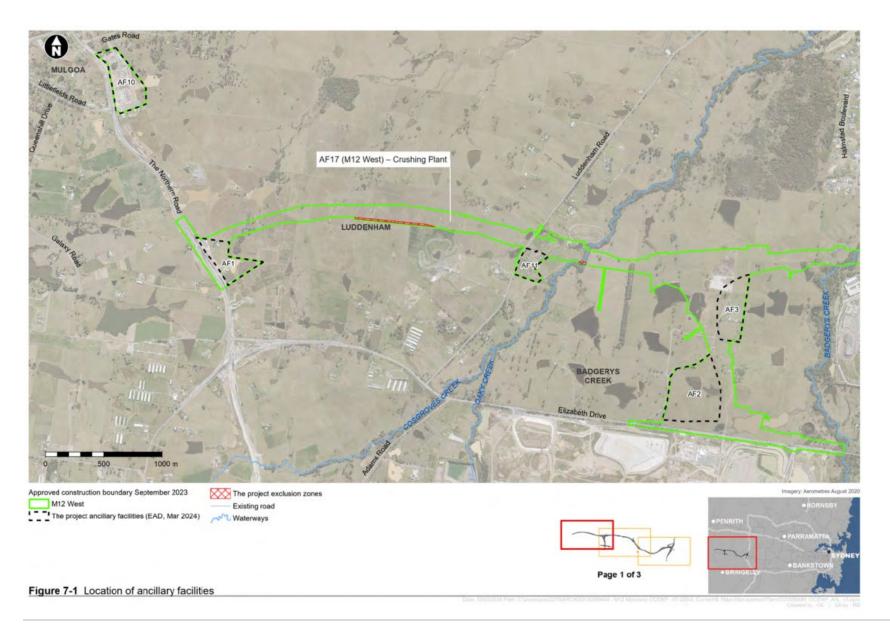
- Offices and meeting rooms
- Staff amenities
- Light vehicle parking and access
- Plant and equipment maintenance workshops
- Materials laydown and storage areas
- Perimeter fencing, including visual screening
- Equipment storage
- Crushing, grinding and screening.

The final type, location and number of ancillary facilities (except for minor ancillary facilities) will be identified in the Construction Contractors' Site Establishment Management Plans (SEMP), prepared in accordance with NSW CoA A16. The SEMPs will be prepared prior to the establishment of any ancillary facility (other than minor ancillary facilities) and included as part of the Construction Contractors' CEMPs.

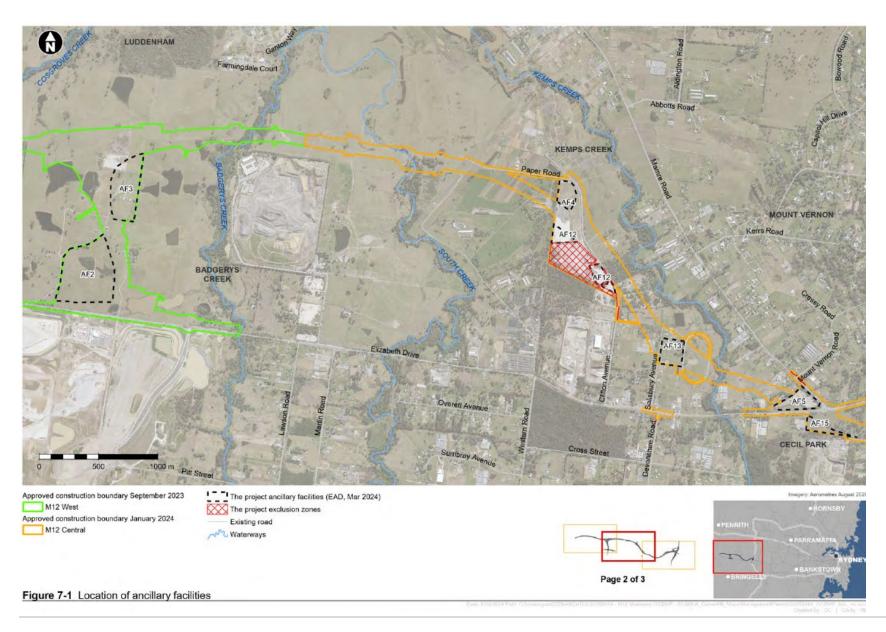
The SEMPs will detail all sites intended for use as ancillary facilities for the Project. Any additional ancillary facilities identified for the Project that have not been assessed in the Environmental Assessment Documentation will be assessed in accordance with the criteria in NSW CoA A15, using the ancillary facilities assessment provided in Appendix A4 of the OCEMP. This will include assessment of the ancillary facilities proximity to sensitive receivers, impacts to heritage items, threatened species, populations or ecological communities and whether the ancillary facility can be managed within the performance outcomes set out in the Infrastructure Approval. Where additional ancillary facilities do not meet the requirements of NSW CoA A15, a modification assessment report will be prepared for the Planning Secretary's approval.

In accordance with NSW CoA A20, lunch sheds, office sheds, portable toilet facilities can also be established when the ER has assessed that only minor amenity impacts to surrounding residences and businesses are present. This includes consideration of matters such as compliance with the *Interim Construction Noise Guideline* (DECC, 2009).











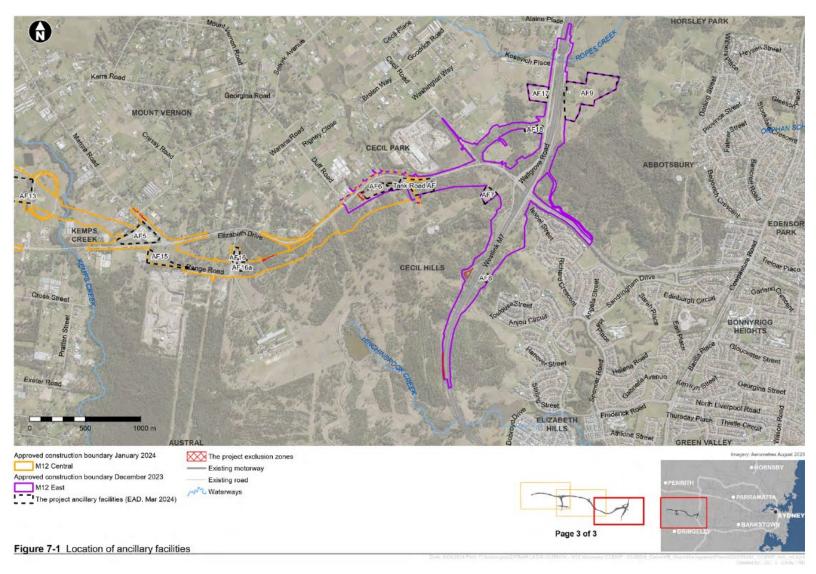


Figure 7-1 Location of ancillary facilities



7.2.5 Construction traffic noise impacts

Construction traffic will access construction sites using only designated heavy vehicle routes such as the M7 Motorway, Elizabeth Drive and The Northern Road. The assessment of construction traffic noise in the Environmental Assessment Documentation concluded that no noticeable increases in road traffic noise are predicted where construction vehicles use major roads.

Where local roads are used to access compounds, the Construction Contractors will be required to 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 the Construction Contractors 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, mitigation options will be required to be further investigated by the Construction Contractor.

7.2.6 Operational Noise Treatments

Noise modelling was undertaken in the ARSR to determine operational noise treatment options. The assessment concluded that diamond grind continuous reinforced concrete pavement and atproperty treatments will be provided for operational noise mitigation. This pavement type would reduce the overall noise levels by about 3 dB when compared to plain concrete as previously reported in the EIS and Amendment Report. Noise modelling was completed during detailed design to confirm operational noise mitigation measures and included within the Operational Noise Review (ONR) completed by GHD in 2021 for M12 West and M12 Central and in March 2023 for M12 East. Figure 7-2 details the locations and types of at-property treatment for receivers located in the Project. It is noted that the figures depict operational NCAs rather than the amended construction NCAs depicted in previous figures.

In accordance with NSW CoA E53 and as agreed by the Planning Secretary (approval received July 28, 2023), where the NML is likely to be exceeded, mitigation must be implemented by July 2024, in the vicinity of the impacted receivers to minimise construction noise impacts. TfNSW will engage a suitably qualified contractor to undertake these works.

The types of at-property treatments detailed in the ONR have been calculated using the DRAFT *At-Receiver Noise Treatment Guideline* (ARNTG) (Roads and Maritime, 2018). Table 7-14 details the level of exceedance above the criteria following any noise reduction from quieter pavements. Details of the treatment packages are provided in Appendix B of the ARNTG and are dependent on the building construction material (Appendix E).

Table 7-14: Indicative treatment packages for the Project

Treatment Package	Exceedance of criteria, dBA	Affected M12 West residential properties ¹³	Affected M12 Central residential properties	Affected M12 Central non- residential properties	Affected M12 East residential properties	Affected M12 East non- residential properties
Type 1	1-5	13	64	1	9	0
Type 2	6-8	5	55	2	17	1

¹³ No affected non-residential properties were identified in M12 West.



Treatment Package	Exceedance of criteria, dBA	Affected M12 West residential properties ¹³	Affected M12 Central residential properties	Affected M12 Central non- residential properties	Affected M12 East residential properties	Affected M12 East non- residential properties
Type 3	9-11	4	42	1	8	0
Type 4	12-14	3	23	2	4	0
Type 5	>14	0	15	2	2	0
Total	-	25	199	8	40	1

Where at-property treatment cannot be installed within six months of the commencement of construction, a report justifying why operational noise mitigation measures will not be implemented will be provided to DPHI in accordance with NSW CoA E55. This will include details of the temporary measures to be implemented to reduce construction noise impacts, until such time that the operational noise mitigation measures will be implemented. All temporary measures will be implemented within six months of the commencement of construction in the vicinity of the impacted receivers.



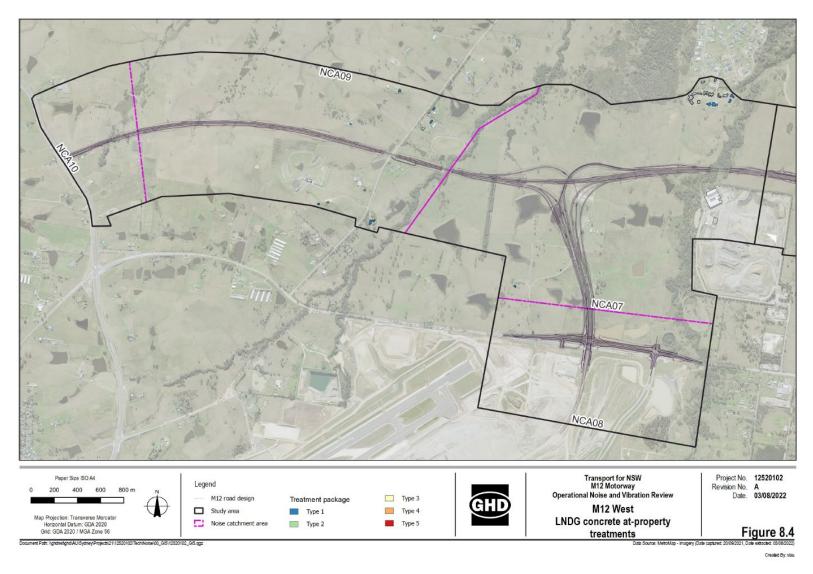
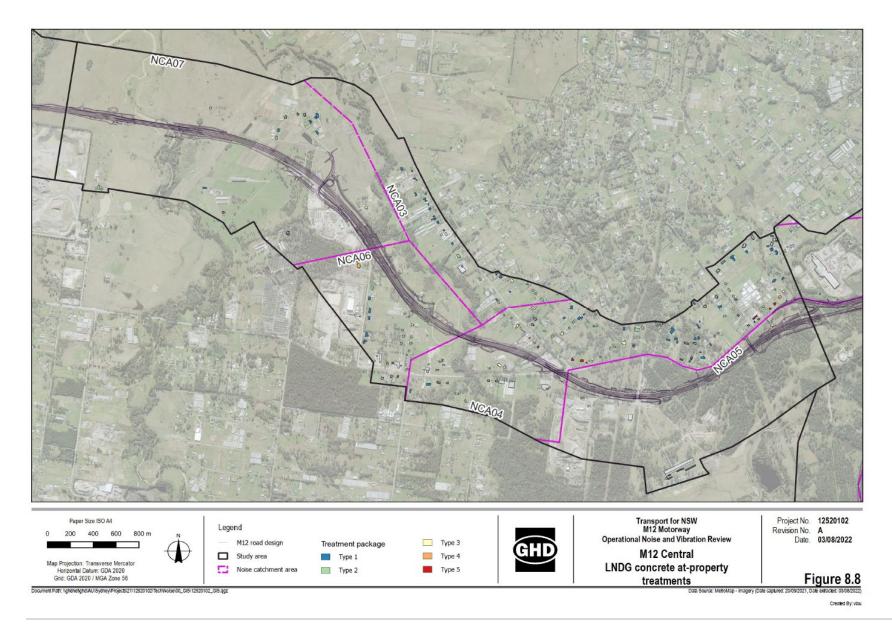


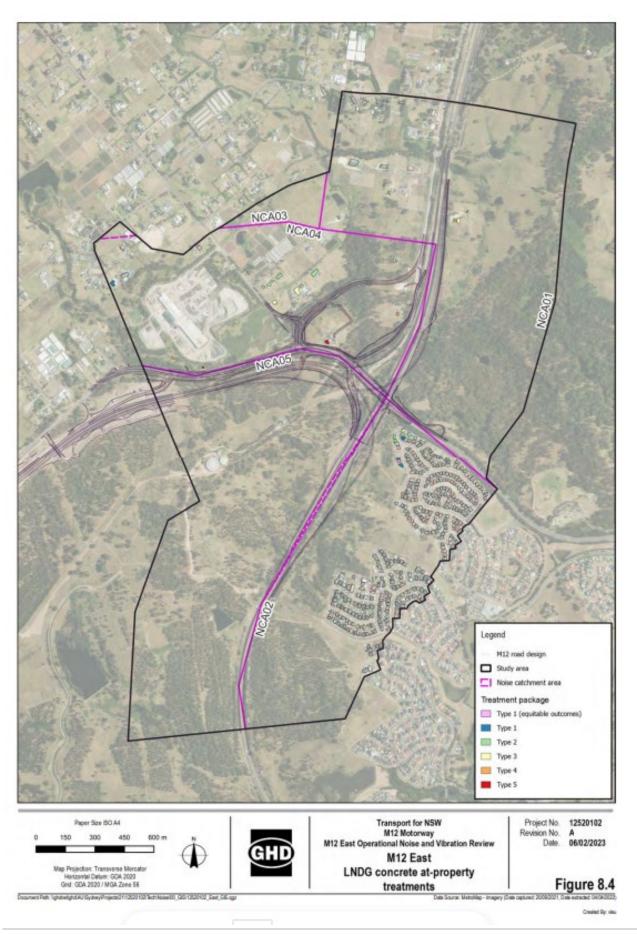
Figure 7-2: Indicative at property treatments for the Project





79 | M12 Motorway OCEMP: Construction Noise and Vibration Management Sub-plan June 2024 | Version P UNCONTROLLED WHEN PRINTED





80 | M12 Motorway OCEMP: Construction Noise and Vibration Management Sub-plan June 2024 | Version P UNCONTROLLED WHEN PRINTED



7.3 Construction vibration impacts

7.3.1 Construction vibration assessment

Vibration impacts to residents and buildings are expected during construction of the Project. The main sources of construction vibration include:

- Vibratory rollers
- Rock breaking
- Hydraulic hammers
- Vibratory pile drivers
- Pile boring
- Jackhammers.

The main sources of vibration during construction of the Project will be associated with the use of vibratory rollers and rock breakers. A large vibratory roller produces noticeable vibration and is likely to be used throughout the construction of the Project. 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 and attended vibration measurements will be required at the start of the works to determine the risk of exceeding the vibration objectives.

The distance between the construction works and the nearest sensitive receivers is generally sufficient for most buildings not to suffer cosmetic damage. However, about 21 structures spread across all Project stages, are located within the recommended minimum working distance.

Where works are within the minimum working distances and considered likely to exceed the cosmetic damage objectives, construction works will not proceed unless:

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

Certain receivers which are near the construction footprint are within the human comfort minimum working distance and occupants of affected buildings may be able to perceive vibration impacts at times when vibration generating equipment is in use. Where impacts will be perceptible, they will likely only be apparent for relatively short durations when equipment such as rock-breakers or vibratory rollers are in use nearby.

Detailed heritage assessments carried out for the Project as part of the EIS identified nine heritage items as being potentially impacted by vibration:

- McGarvie-Smith farm
- The Fleur radio telescope site
- Luddenham Road alignment
- Cecil Park school, post office and school church
- Exeter farm archaeological site



- South Kemps and Badgerys Creek confluence weirs scenic landscape
- McMasters field station
- Fleurs Aerodrome
- Upper Canal System.

Where these heritage structures are located within or near the project boundary, they may be susceptible to vibration impacts associated with construction equipment if they are operating within the safe working distance for heritage sensitive receivers.

Refer to the CCHMP for detail on the properties potentially subject to vibration criteria exceedances.

7.3.2 Construction ground-borne noise

Construction works can cause ground-borne noise impacts in nearby buildings when vibration generating equipment is in use. The majority of receivers are sufficiently distant from the works for ground-borne noise impacts on be minimal. Where residential receivers are located near construction works, airborne noise levels will typically be dominant over the ground-borne component.



8 Environmental control measures

A range of environmental requirements and management measures are identified in the Environmental Assessment Documentation, the CoA and relevant TfNSW documents. Specific measures and requirements to address noise and vibration impacts are outlined in Table 8-1.



Table 8-1: Noise and vibration management and mitigation measures

		When to	Responsibility	A	pplicability		Reference	Evidence of
ID	Management Measure	implement	for Implementation	M12 West	M12 Central	M12 East	or source	implementation
NV1	 All employees, contractors and subcontractors are to receive a Project induction prior to commencing work on site. The induction will include: Existence and requirements of this NVMP Relevant legislation and guidelines Normal construction hours and exemptions The process for seeking approval for out-of-hours works, including consultation Location of noise sensitive areas Complaints reporting and recording How to implement noise and vibration management measures Specific responsibilities to minimise impacts on the community and built environment from noise and vibration associated with the works. 	Construction	Construction Contractor ESR	*	✓	*	Standard industry practice	Induction records
NV2	Training will be provided to relevant Project personnel, including relevant subcontractors, on noise and vibration requirements from this Plan, toolboxes or targeted training	Prior to Construction Construction	Construction Contractor ESR	√	√	✓	Standard industry practice G36	Training records Toolbox talk sign on sheets
NV3	No swearing or unnecessary shouting or loud stereos / radios on site. Dropping of materials from height, throwing of metal items and slamming of doors will also be avoided	Construction	Construction Contractor Foreman / Site Supervisor	√	√	√	Standard industry practice	Site inspection records Toolbox talks



		When to	Responsibility	A	pplicability	,	Reference	Evidence of
ID	Management Measure	implement	for Implementation	M12 West	M12 Central	M12 East	or source	implementation
NV4	No blasting will be undertaken.	Construction	Construction Contractor Foreman / Site Supervisor	✓	√	√	NSW CoA E49	Site inspection records Toolbox talks
NV5	A noise screening assessment will be carried out for ancillary facilities with the potential to involve high noise generating activities. Should OOHW be required, an NVIS would be developed.	Prior to construction	Construction Contractor ESR	✓	✓	✓	REMM NV03	Noise modelling outputs
NV6	A Construction Noise and Vibration Monitoring Program will be developed and implemented.	Prior to construction	Construction Contractor ESR	*	√	~	NSW CoA C11(a) NSW CoA C14	Appendix B Monitoring records
NV7	Monitoring will be carried out at the start of high noise and vibration activities (such as piling, rock-breaking, vibratory rolling and concrete sawing) to confirm that actual noise and vibration levels are consistent with the noise and vibration impact predictions.	Construction	Construction Contractor ESR	✓	√	√	REMM NV04	Monitoring records
NV8	Where monitoring identifies higher levels of noise and vibration compared to predicted levels, or where mitigation is shown to be ineffective against measured noise and vibration levels, additional mitigation measures will be identified and implemented to appropriately manage impacts where feasible and reasonable.	Construction	Construction Contractor Construction Manager Construction Contractor ESR	~	✓	✓	REMM NV04	Monitoring records Site inspection records



		When to	Responsibility	A	pplicability		Reference	Evidence of
ID	Management Measure	implement	for Implementation	M12 West	M12 Central	M12 East	or source	implementation
NV9	In-situ monitoring will be carried out to confirm the vibration levels and assess the impact of vibration. Where the monitoring identifies exceedances in the relevant criteria, or where impacts are identified, additional mitigation measures will be identified and implemented to appropriately manage impacts.	Prior to Construction	Public Liaison Officer (PLO) Construction Contractor Construction Manager	✓	✓	√	REMM NV10	Consultation records Construction documentation
NV10	All construction plant and equipment used on site will be fitted with properly maintained noise suppression devices in accordance with the manufacturer's specifications	Construction	Construction Contractor Foreman / Site Supervisor	✓	√	√	G36	Plant inspection records
NV11	All construction plant and equipment used on the site will be maintained in an efficient condition, in accordance with the manufacturers' specification. If a piece of plant or equipment is found to exceed the noise levels included in modelling, the following will occur: If available and appropriate, a quieter piece of plant or equipment will be utilised in place of the offending plant / equipment; On-site mitigation (e.g. noise blankets) will be reviewed; and /or The noise assessment will be repeated with the accurate noise level of the plant / equipment.	Construction	Construction Contractor Foreman / Site Supervisor	*	✓	*	G36	Plant inspection records Site inspection records



		When to	Responsibility	A	pplicability	,	Reference	Evidence of
ID	Management Measure	implement	for Implementation	M12 West	M12 Central	M12 East	or source	implementation
NV12	All construction plant and equipment used on the site will be operated in a proper and efficient manner.	Construction	Construction Contractor Foreman / Site Supervisor	*	✓	√	G36	Site inspection records Safety inspection records EWMS Toolbox talk record
NV13	Non-tonal (white noise) movement alarms will be used in place of tonal reversing alarms for Contractor owned plant and subcontract plant used at night or during the day.	Construction	Construction Contractor Foreman / Site Supervisor	✓	√	*	G36	Site inspection records EWMS Toolbox talk record
NV14	Plant and machinery will be switched off when it is not in use for more than 15 minutes	Construction	Construction Contractor Foreman / Site Supervisor	✓	✓	✓	G36	Induction records EWMS Pre-start briefing
NV15	Stationary noise sources will be enclosed or shielded where reasonable and feasible. This will apply to plant and equipment such as generators, stationary concrete cutters, stationary asphalt corers, stationary vacuum trucks, and stationary jack hammers	Construction	Construction Contractor Foreman / Site Supervisor	✓	*	√	Standard industry practice	Site inspection records EWMS
NV16	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	Construction	Construction Contractor Foreman / Site Supervisor	√	✓	*	Standard industry practice	Site inspection records EWMS



		When to	Responsibility	A	oplicability		Reference	Evidence of
ID	Management Measure	implement	for Implementation	M12 West	M12 Central	M12 East	or source	implementation
NV17	Construction vehicle movements (both on and offsite) will be managed to minimise noise impacts including (but not be limited to): • Establishment and use of internal haul routes, or existing major roads where this is not feasible • Restriction of heavy vehicle movements to standard construction hours • Locating traffic marshalling areas away from residences to minimise noise impacts from idling vehicles • Instructing workers on the operation of heavy vehicles entering and exiting the site to minimise noise.	Prior to Construction During Construction	Construction Contractor Construction Manager Construction Contractor Foreman / Site Supervisor	•	✓	✓	REMM NV12	Site inspections Construction TMP
NV18	Where reasonable and feasible, receivers identified as requiring at-property treatment for operational noise mitigation will be identified and offered treatment before construction activities begin that are likely to impact them.	Prior to Construction	TfNSW	✓	✓	✓	REMM NV05	Consultation records Overarching OOHW Protocol
NV19	Consideration will be given to at-property noise mitigation at receivers impacted by ancillary facilities subject to the results of the noise assessments	During construction	Construction Contractor Construction Manager	✓	✓	√	REMM NV03	Monitoring records Consultation records Construction documentation



		When to	Responsibility	A	pplicability		Reference	Evidence of
ID	Management Measure	implement	for Implementation	M12 West	M12 Central	M12 East	or source	implementation
NV20	Appropriate safe working distances will be implemented to avoid impacts on structures and sensitive receivers during activities that generate vibrations.	Construction	Construction Contractor Construction Manager	✓	✓	✓	REMM NV06	Site inspection records
			Construction Contractor's ESR					
NV21	The use of alternatives to vibration generating equipment will be considered where vibration impacts are predicted.	Construction	Construction Contractor Construction Manager	√	√	✓	REMM NV07	Construction documentation
			Construction Contractor's ESR					
NV22	Where works are within the minimum working distances and considered likely to exceed the cosmetic damage objectives, construction works will not proceed unless:	Construction	Construction Contractor Construction Manager	√	√	√	REMM NV08	Construction documentation
	A different construction method with lower source vibration levels is used, where feasible		Construction Contractor ESR					
	 Attended vibration measurements are carried out at the start of the works to determine the risk of exceeding the vibration objectives. 							



		When to	Responsibility	A	pplicability	,	Reference	Evidence of
ID	Management Measure	implement	for Implementation	M12 West	M12 Central	M12 East	or source	implementation
NV23	Properties at risk of exceeding the screening criteria for cosmetic damage will be notified before vibrating works. 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 monthly for the duration of the potential exceedances	Construction	PLO Construction Contractor ES	✓	√	~	NSW CoA E41	Consultation records
NV24	Vibration testing 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 are likely to be exceeded, the construction methodology will be reviewed and, if necessary, amended and/or implement additional mitigation measures implemented.	Construction	Construction Contractor Construction Manager Construction Contractor ESR	✓	√	~	NSW CoA E42	Monitoring results Construction documentation
NV25	Advice from a heritage specialist will be implemented on methods and locations for installing equipment used for vibration, movement and noise monitoring at heritagelisted structures prior to installing such equipment.	Construction	Construction Contractor ESR	√	√	1	NSW CoA E43	Heritage specialists report
NV26	Advice from a suitably qualified and experienced built heritage specialist will be obtained and implemented before conducting at-property treatment on heritage items.	Construction	Construction Contractor's ESR	✓	√	√	NSW CoA E44	Heritage specialists report



		When to	Responsibility	A	pplicability		Reference	Evidence of
ID	Management Measure	implement	for Implementation	M12 West	M12 Central	M12 East	or source	implementation
NV27	Prior to the commencement of vibration generating works that could impact on the structure/asset (including but not limited to utility assets and heritage items and building/structures of heritage significance), 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).	Building inspector Landowner list	Construction Contractor ESR	~	✓	✓	NSW CoA E76 REMM NV09	Pre-Construction Survey Report
NV28	After completion of the works, post-condition surveys of all structures/assets (including but not limited to utility assets, heritage items and building/structures of heritage significance) for which Pre-Construction Condition Surveys were undertaken, will be completed by a suitably qualified person. The results of the surveys will be documented in a Post-Construction Condition Survey for each building surveyed. The Post-Construction Condition Survey Reports will be provided to the owner of the structures/assets surveyed, and no later than four (4) months following the completion of construction activities that have the potential to impact on the structure / asset.	Building inspector Landowner list	Construction Contractor ESR	•	✓	~	NSW CoA E77	Post-Construction Survey Report
NV29	Surveys will be carried out to confirm the existing condition of the WaterNSW Upper Canal System and Jemena high pressure gas pipelines to determine appropriate vibration criteria.	Prior to construction	PLO Construction Contractor	√	√	√	REMM NV10	Consultation records Construction documentation



		When to	Responsibility	A	pplicability	,	Reference	Evidence of implementation
ID	Management Measure	implement	for Implementation	M12 West	M12 Central	M12 East	or source	
	A vibration criterion of a peak particle velocity (PPV) will be determined in consultation with the relevant utility/service providers, including WaterNSW.		Construction Manager					
NV30	The following structures have the potential to be within the safe working distances for sensitive structures (Group 3 from DIN 4150): Item 1: McGarvie Smith Farm Item 2: Fleurs Radio Telescope Site Item 4: Upper Canal System Item 6: McMaster Field Station Item 7: Fleurs Aerodrome. A detailed survey will be completed to determine the potential for vibration impacts and to define appropriate criteria for each heritage item. Vibration monitoring will be carried out when vibration intensive tasks are occurring within the minimum working distances to heritage structures. Where the monitoring identifies exceedances in the relevant criteria, or where impacts are identified, additional mitigation measures will be identified and implemented to appropriately manage impacts.	Prior to construction	PLO Construction Contractor ESR	✓	✓	✓	REMM NV11	Consultation records Monitoring records
NV31	At-property treatment does not preclude the application of other noise and vibration mitigation and management measures including temporary accommodation to be implemented to manage construction noise.	Construction	PLO Construction Contractor	√	~	✓	NSW CoA E56	Consultation records Construction documentation



		When to	Responsibility	A	pplicability		Reference	Evidence of
ID	Management Measure	implement	for Implementation	M12 West	M12 Central	M12 East	or source	implementation
			Construction Manager					
NV32	Measures to minimise and manage construction fatigue will be investigated through the planning of construction staging.	Prior to construction	Construction Contractor Construction Manager	✓	√	√	REMM NV02	Construction documentation
			Construction Contractor ESR					
NV33	Work, including those by third-parties, will be coordinated to ensure respite periods are provided.	Construction	Construction Contractor Construction Manager	*	√	√	NSW CoA E45	Consultation records
			Construction Contractor ESR					
NV34	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 timetabled within sensitive periods, unless offers of other reasonable arrangements have been made to the affected institutions. The offers of other reasonable arrangements will be implemented at no cost to the affected institution.	Construction	Construction Contractor Construction Manager Construction Contractor ESR	~	√	>	NSW CoA E39	Construction documentation
NV35	Construction works will be scheduled in consultation with managers of other nearby	Construction	PLO	✓	✓	✓	REMM NV13	Consultation records



ID	Management Measure	When to implement	Responsibility for Implementation	Applicability			Reference	Evidence of
				M12 West	M12 Central	M12 East	or source	implementation
	projects that are likely to result in a 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.		Construction Contractor's ESR Construction Contractor Construction Manager				CoA E45	Construction documentation Interface meeting minutes
NV36	NVIS will be prepared for any work that may exceed the NMLs and vibration criteria specified at any residence outside the construction hours, or where receivers will be highly noise affected.	Construction	Construction Contractor ESR	✓	√	√	NSW CoA E40	NVIS
NV37	Crushing and grinding will only be undertaken during the following hours: (a) 7:00 am to 6:00 pm Mondays to Fridays, inclusive; (b) 8:00 am to 6:00 pm Saturdays; and (c) at no time on Sundays or public holidays. Unless otherwise approved by the Planning Secretary, through an EPL or it meets the requirements of safety and emergencies.	Construction	Construction Contractor ESR	~	✓	*	NSW CoA E48	Site inspections records
NV38	Respite periods or temporary alternative accommodation, will be made available to residents affected by out-of-hours Work where the construction noise levels between: (a) 10:00 pm and 7:00 am, Monday to Friday;	Construction	PLO Construction Contractor ESR	√	√	√	NSW CoA E46	Consultation records



	Management Measure	When to	Responsibility	A	pplicability	,	Reference or source	Evidence of
ID		implement	for Implementation	M12 West	M12 Central	M12 East		implementation
	 (b) 10:00 pm Saturday to 8:00 am Sunday; and (c) 6:00 pm Sunday and public holidays to 7:00 am the following day unless that day is Saturday then to 8:00 am, are predicted to exceed the NML by 25 dB(A) or are greater than 75 dB(A) (LAeq(15 min)), whichever is the lesser and the impact is planned to occur for more than two nights over a seven day rolling period. 							
NV39	Appropriate respite periods for out-of-hours work will be identified in consultation with the community at each affected location on a regular basis.	Construction	PLO Construction Contractor ESR	*	✓	✓	NSW CoA E47	Consultation records
NV40	Select the smallest rock hammers capable of efficiently completing the work, where feasible and reasonable.	Construction	Construction Contractor Construction Manager	1	✓	✓	Standard industry practice	Site inspections records
NV41	The Construction Contractor will adhere to the Upper Canal Pheasants Nest to Prospect Reservoir Conservation Management Plan (NSW Public Works Governments Architect's Office, 2016) and Guidelines for development adjacent to the Upper Canal and Warragamba Pipelines (WaterNSW, 2020).	Construction	Construction Contractor Construction Manager	~	√	✓	NSW CoA E81	Site inspections records
NV42	Construction will not destroy, modify or otherwise cause direct or indirect damage to the	Construction	Construction Contractor	✓	✓	✓	NSW CoA E82	Site inspections records



		When to	Responsibility	A	Applicability		Reference	Evidence of
ID	Management Measure	implement	for Implementation	M12 West	M12 Central	M12 East	or source	implementation
	Upper Canal System, including the Cecil Hills Tunnel, and Tunnel Shafts 3 and 4.		Construction Manager					
NV43	Boundary screening will be erected around all construction ancillary facilities that are adjacent to sensitive receivers.	Construction	Construction Contractor Construction Manager	✓	√	√	NSW CoA A21	Site inspections records
Operati	ional noise treatment							
NV44	An Operational Noise Review will be prepared for all Project stages to assess and confirm mitigation measures. Operational noise mitigation measures including at-property treatment will be implemented where the NML is likely to be exceeded and will occur within six months of the commencement of construction in the vicinity of the impacted residences, unless otherwise agreed with the Planning Secretary.	ONR must be submitted to DPIE prior to implementing atproperty treatment Within first six months of construction commencement in the vicinity of the impacted	TfNSW	*	✓	*	NSW CoA E52 NSW CoA E53	Section 7.2.6 Consultation records Operational Noise Review
NV45	If the ONR for M12 East is not completed within the six months of commencement of construction as per NSW CoA E53, the atproperty operational noise mitigation measures will be consistent with the measures and the properties identified in Section 7.2 of Appendix G in the M12 Motorway Amendment Report.	Prior to construction and within first six months of commencement of construction	TfNSW			✓	NSW CoA E54	Section 7.2.6 Consultation records Operational Noise Review



	Management Measure	When to	Responsibility	Applicability			Reference	Fuidance of
ID		When to implement	for Implementation	M12 West	M12 Central	M12 East	or source	Evidence of implementation
NV46	All requests to the Planning Secretary where the NML is likely to be exceeded at receivers will be accompanied with a report justifying why operational noise mitigation measures required will not be implemented within the six months. This report will include details of the temporary measures to be implemented to reduce construction noise impacts and until such time the operational noise mitigation measures will be implemented. All temporary measures will be implemented within six months of the commencement of construction in the vicinity of the impacted receivers. The report will be submitted to the Planning Secretary before the commencement of construction which will affect the identified residences.	Prior to construction and within first six months of commencement in the vicinity of the impacted residences	TfNSW		•	•	NSW CoA E55	Section 7.2.6 Consultation records Operational Noise Review



9 Compliance management

9.1 Roles and responsibilities

The Project's organisational structure and overall roles and responsibilities are outlined in Section 5.1 of the OCEMP. Specific responsibilities for the implementation of environmental controls are detailed in Section 8 of this NVMP.

9.2 Communication

An OCS has been prepared in accordance with the requirements of NSW CoA B1 and B2 to document the approach to stakeholder and community communications for the Project. The OCS identifies opportunities and tools for providing information and consulting with the community and stakeholders during the construction of the Project. The Construction Contractors will support the delivery of the OCS.

Noise and vibration management information will be communicated to the community and stakeholders in accordance with the principles and procedures outlined in the OCS and the *Construction Noise and Vibration Guideline* (Roads and Maritime, 2016). TfNSW and the Construction Contractors will adhere as a minimum to the following principles and procedures relevant to noise and vibration management:

- Good engagement with the community will be maintained to facilitate effective Project delivery with consideration of community impact, including procedures for notifying residents, business owners and other sensitive receivers, of any noise- or vibrationintensive construction activities likely to affect their amenity
- The community will be informed of the dates for the intended works, sequencing, timing and levels of noisy or vibration intensive events at least seven calendar days in advance of the activity being undertaken
- Minimising construction noise and vibration will be viewed as a continuous improvement exercise that is inclusive of stakeholders
- Site personnel and the community will be informed of the effort and methods undertaken to reduce noise and vibration impacts for the Project
- Potentially affected community, religious, educational institutions and noise and vibrationsensitive businesses will be consulted prior to scheduling the construction works to identify periods during which they will be adversely affected by noise generating works. Works will not be scheduled during the periods identified by the stakeholders unless TfNSW, the Construction Contractor and the sensitive receiver have made other arrangements (at no cost to the affected receiver) or the Secretary has otherwise approved the works.

For further detail on the measures implemented for advising the community in advance of upcoming work, including upcoming out-of-hours work, refer to the OCS.

Further detail about the OCS is provided in Section 5.5 of the OCEMP. Community consultation methods relating to OOHW are contained in the Overarching OOHW Protocol (Appendix C).



9.3 Complaints management

In accordance with NSW CoA B6, TfNSW will develop a Complaints Management System (CMS) to document the overall approach to complaints management for the Project.

The Construction Contractor will have the following information available to facilitate complaints and will be accessible to the community:

- 24-hour telephone number for the registration of complaints and enquiries
- Postal address to which written complaints and enquires may be sent
- Email address to which electronic complaints and enquiries may be transmitted; and
- Mediation system for complaints unable to be resolved.

The Construction Contractors will adopt the requirements of the CMS, including reporting requirements. The CMS will include a Complaints Register which will record the details of all complaints relating to the Project. The CMS includes a Complaints Register in accordance with NSW CoA B8, which will record the details of all complaints relating to the Project including the following as a minimum:

- Date and time of the complaint
- Method by which the complaint was made
- Any personal details of the stakeholder
- Number of people affected in relation to a complaint
- Nature of the complaint
- Action taken in relation to the complaint, means by which the complaint was addressed and any follow up
- Whether resolution was reached, with or without mediation
- If no action taken, reasons why
- The status of resolution of the complaint.

All complaints will be recorded in the Complaints Register (by the Communications Manager) within 24 hours. The Complaints Register will be provided to the ER on the day complaints are received. The Complaints Register will be provided to the Planning Secretary on request in accordance with NSW CoA B9. The Construction Contractor is not required to submit a report for any reporting period during which no complaints have been received.

If the investigation identifies construction works or activities being undertaken as the likely source of the complaint, the Construction Contractor will make an offer to the complainant to undertake attended noise or vibration monitoring at their premises. If the offer to undertake attended noise or vibration monitoring is accepted, the Construction Contractor will undertake the monitoring:

- As soon as practicable or
- At a time agreed with the complainant.

The Construction Contractor will advise each complainant of the results of its investigation of their complaint and any proposed remedial action.



9.4 Training

To ensure that this Plan is effectively implemented, all site personnel (including sub-contractors) will undergo site induction training that includes construction noise and vibration management issues prior to construction commencing. The induction training will address element related to noise and vibration management including:

- Existence and requirements of this overarching CNVMP, the Construction Contractor's CNVMP and all plans and procedures prepared under the CNVMPs
- Relevant legislation, regulations and EPL conditions (where applicable)
- · Incident response, management and reporting
- Standard construction hours
- The process for seeking approval for out of hours works, including consultation
- Noise management measures during night works
- Location of noise sensitive areas
- Complaints response and reporting
- General noise and vibration management measures
- Specific responsibilities to minimise impacts on the community and built environment from noise and vibration associated with the works.

Targeted training in the form of toolbox talks or specific training will also be provided to personnel with a key role in noise and vibration management (including those undertaking noise or vibration monitoring) or those undertaking an activity with a high risk of environmental impact. Site personnel will undergo refresher training at not less than six monthly intervals.

The ER will review and approve the induction and training program prior to the commencement of construction and monitor implementation.

Daily pre-start meetings conducted by the Construction Contractor Foreman/ Site Supervisor will inform the site workforce of any environmental issues relevant to noise and vibration that could potentially be impacted by, or impact on, the day's activities.

Further details regarding staff induction and training are outlined in Section 5.3 of the OCEMP.

9.5 Inspection and monitoring

9.5.1 Monitoring

NSW CoA C11 requires that Construction Monitoring Programs to be prepared in consultation with the relevant government agencies identified for each to compare actual performance of construction against the performance predicted to inform management measures. This includes the development of a Construction Noise and Vibration Monitoring Program. The Construction Noise and Vibration Monitoring Program has been prepared in accordance with NSW CoA C11, C13 and C14 and is provided in Appendix B.



Monitoring will include, but not be limited to:

- Monthly noise monitoring at sensitive receivers
- Spot checks of noise intensive plant
- Attended vibration monitoring
- Continuous vibration monitoring
- Dilapidation surveys of buildings and structures.

Further details of monitoring requirements for the Project are presented in Section 7.2 of the OCEMP.

9.5.2 Inspections

Regular inspections of sensitive areas and activities will occur for the duration of the Project. The Construction Contractor ESR will carry out weekly site inspections. TfNSW will also conduct independent inspections to confirm the Construction Contractors' compliance with noise and vibration management requirements.

Weekly and other routine inspections by the TfNSW ESM (or delegate), Environmental Review Group (ERG) representatives and the ER will occur throughout construction. Detail on the nature and frequency of these inspections are documented in Section 7.1 of the OCEMP.

9.6 Incident planning and response

Responses to incidents will be undertaken as described in Section 6 of the OCEMP and in accordance with the Environmental Incident Classification and Reporting Procedure (refer to Appendix A7 of the OCEMP).

9.7 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of noise and vibration management measures, compliance with this Plan, conditions of approval and other relevant approvals, licenses and guidelines.

Audit requirements are detailed in Section 7.4 of the OCEMP.

9.8 Non-conformance

A non-conformance is the failure or refusal to comply with the requirements of project system documentation, including this Plan. Any member of the Construction Contractors' Project team may raise a non-conformance or improvement opportunity.

Where a non-conformance is detected or monitoring results directly attributable to the Project exceed the target set in the Construction Noise and Vibration Monitoring Program, the process described in the Monitoring Program and Section 7.3 of the OCEMP will be implemented. The Construction Contractor's Quality Plan will describe the process for managing non-conforming work practices and initiating corrective / preventative actions or system improvements in accordance with the process outlined in Section 7.3 of the OCEMP.



9.9 Reporting and identified records

Reporting requirements and responsibilities are documented in Section 7.3 of the OCEMP and Section 6.1 and 6.2 of Appendix B of this CNVMP. In summary, the Construction Contractors will prepare monthly environmental reports and quarterly construction monitoring reports.

The Construction Contractors will be required to maintain accurate records substantiating all construction activities associated with the Project or relevant to the conditions of approval, including measures taken to implement this Plan. Records will be made available to the DPHI and DCCEEW upon request, within the timeframe nominated in the request.

9.9.1 NVIS

Noise and Vibration Impact Statements (NVIS) will be prepared for any work that may exceed the NMLs and vibration criteria specified in NSW CoA E38 at any residence outside the construction work hours, or where receivers will be highly noise affected.

The NVIS will outline mitigation measures identified through consultation with affected sensitive land user(s). The mitigation measures will be implemented for the duration of the work. A copy of the NVIS will be provided to the ER prior to the commencement of the associated work, and may be provided to the Planning Secretary for information.



10 Review and improvement

10.1 Continuous improvement

Continuous improvement of this Plan will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance
- Identify environmental risks not already included in the risk register
- Determine the cause or causes of non-conformances and deficiencies
- Develop and implement a plan of corrective and preventative action to address any nonconformances and deficiencies
- Verify the effectiveness of the corrective and preventative actions
- Document any changes in procedures resulting from process improvement
- Make comparisons with objectives and targets.

The Construction Contractors will be responsible for ensuring Project environmental risks are identified and included in the risk register and appropriate mitigation measures implemented throughout the construction of the Project, as part of the continuous improvement process.

The Construction Contractors will hold environmental risk assessment workshops prior to the commencement of construction to identify high noise and vibration risk activities and representative sensitive receivers that will require monitoring during construction, as outlined in the Construction Noise and Vibration Monitoring Program (refer to Appendix B).

The process for continuous identification and analysis of new risks associated with noise and vibration that may arise during construction will be facilitated by:

- Construction noise and vibration monitoring program (as outlined in Appendix B)
- Regular inspections of sensitive areas and activities and observations by site personnel (refer to Section 9.5.2)
- Revision of this Plan and the Construction Contractor's CNVMP and/or noise and vibration management measures as required in response to community complaints or requests from regulatory agencies, the ER or the Planning Secretary.

This continuous risk analysis approach will ensure prompt identification of new risks and ensure efficient mitigation through implementation of appropriate management measures, as outlined in Section 8.



10.2 Update and amendment

The processes described in Section 7.7 of the OCEMP may result in the need to update or revise this Plan. This will occur as needed.

Any revisions to this Plan will be in accordance with the process outlined in Section 7.7 of the OCEMP. A copy of the updated Plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure.

The review and document control processes for this CNVMP is described in Section 1.12 and 7.6 of the OCEMP.



Appendix A – Consultation Correspondence



1 Introduction

As detailed in Section 1.5 of the CNVMP, in accordance with NSW CoA C4(b), consultation has been undertaken with the following government agencies and stakeholders during the preparation of the CNVMP:

- WaterNSW
- Sydney Water
- Jemena
- Penrith City Council
- Liverpool City Council
- Fairfield City Council.

A log of the dates of engagement or attempted engagement with the parties identified above has been included in Section 1.5.1 of the CNVMP in accordance with NSW CoA A5(b). Section 2 details the evidence of engagement with each party and responses.

2 Government Agency and Stakeholder Responses

This section provides consultation documentation undertaken during the consultation period with parties including:

- Engagement with parties identified in NSW CoA C4(b) that occurred prior to the submission of the CNVMP for approval by the Planning Secretary as required by NSW CoA A5(a)
- A copy of the responses provided during consultation with the required parties
- A summary of the issues raised during consultation and how they have been addressed as required by NSW CoA A5(d). A description of the outstanding issues raised during consultation and why they have not been addressed has also been included where required as per NSW CoA A5(e).



WaterNSW

This section details the engagement and response from WaterNSW regarding the CNVMP prior to submission for approval and a summary of how the issues have been addressed.

A summary of the issues raised by WaterNSW and how they have been addressed during initial consultation is detailed below.

Section Reference	Comment	TfNSW Response	Section Amended
Table 8-1	WaterNSW agree that the management measures contained within, should mitigate any noise or vibration impacts on the WaterNSW Upper Canal.	Noted.	N/A
Section 1.5	WaterNSW requests to be consulted on any site specific construction noise and vibration monitoring program as it relates to construction works directly above and adjacent to the Upper Canal Corridor.	In accordance with NSW CoA E42, WaterNSW will be consulted with by the Construction Contractor in relation to vibration monitoring for the Upper Canal. This has been clarified within Section 1.5.3 and is identified in Section 8 (NV29) "A vibration criterion of a peak particle velocity (PPV) will be determined in consultation with the relevant utility/service providers, including WaterNSW" and contained in the Table 5-2 of the overarching construction noise and vibration monitoring program (Appendix B). The overarching monitoring procedure for the Upper Canal as detailed in Appendix B, includes: Identify minimum safe working distances by completing a desktop assessment of planned works Undertake attended monitoring at the commencement of works to verify and establish safe working distances Determine site-specific requirements, set up exclusion zones as required and toolbox the requirements to relevant personnel In the event that the vibration testing and attended vibration monitoring shows that the preferred values for vibration are likely to be exceeded, the construction methodology will be reviewed and, if	Section 1.5.2 Section 1.5.3



WaterNSW was also engaged in September 2023 for further consultation on the updated CNVMP in response to changes of NCAs. A summary of the issues raised by WaterNSW and how they have been addressed is detailed below.

Section Reference	Comment	TfNSW Response	Section Amended
N/A	No comment received.	N/A	N/A



Sydney Water

This section details the engagement and response from Sydney Water regarding the CNVMP prior to submission for approval and a summary of how the issues have been addressed.

A summary of the issues raised by Sydney Water and how they have been addressed during initial consultation is detailed below.

Section Reference	Comment	TfNSW Response	Section Amended
Section 1.5.3, Table 8.1	When constructing near SWC asset, there is a need to undertake vibration assessment to identify impact and implement protection measures as necessary.	A range of vibration mitigation measures are contained in the CNVMP Table 8-1 in relation to the management of vibration impacts (i.e. NV7, NV8, NV9, NV20, NV21, NV22, NV27, NV28, NV40). In relation to Sydney Water assets, minimum working distances would be adhered to in the	N/A
		first instance (NV20). Where works are within the minimum working distances and considered likely to exceed the cosmetic damage objectives (NV22), construction works will not proceed unless:	
		A different construction method with lower source vibration levels is used, where feasible	
		Attended vibration measurements are carried out at the start of the works to determine the risk of exceeding the vibration objectives.	
		In addition, both pre-construction survey (NV27) and post-construction survey (NV28) would be carried out where vibration generating works could impacts on the structure/asset. Detailed information regarding vibration criteria and safe working distances are included in Section 5.6 of the CNVMP.	
General	The CNVMP makes specific reference to Water NSW and Jemena assets while SWC is included under utility service provider in general. Is it based on assessment that our assets will not be nearby or expected to have protection measures prior to M12 construction	Reference to Water NSW and Jemena assets are included in the CNVMP based upon wording of specific conditions from the EIS (i.e. Revised Environmental Management Measures NV10) and Conditions of Approval for the Project SSI 9364 (i.e. NSW CoA E42) Mitigation measures as identified in the above comment response outline measures relevant to the management of Sydney Water assets.	N/A



Sydney Water was also engaged in September 2023 for further consultation on the updated CNVMP in response to changes of NCAs. A summary of the issues raised by Sydney Water and how they have been addressed is detailed below.

Section Reference	Comment	TfNSW Response	Section Amended
N/A	In line with the previous SW comments TfNSW need to ensure existing SW assets are adequately protected. TfNSW to continue ongoing interface coordination with Sydney Water to ensure the additional widening scope doesn't impact Sydney Water projects in the area, and that cumulative impacts are effectively mitigated.	TfNSW and its Delivery Partners will continue to ensure Sydney Water assets are adequately protected. TfNSW will also continue to liaise with Sydney Water through ongoing interface meetings to ensure Sydney Water projects are not impacted and cumulative impacts are managed.	No update to documents proposed



Jemena

This section details the engagement and response from Jemena regarding the CNVMP prior to submission for approval and a summary of how the issues have been addressed.

A summary of the issues raised by Jemena and how they have been addressed during initial consultation is detailed below.

Section Reference	Comment	TfNSW Response	Section Amended
Section 5.6	The vibration limit for the Jemena main is 20mm/s for the construction and when the main is operational. The third party (Contractor) needs to set a high alarm at 15mm/s. Please see attached guideline document with ref. to vibration limits at para 4.1.7.	In accordance with the guideline provided by Jemena, the following text has been included into the CNVMP (Section 5.6.2): Jemena guideline 'Designing, constructing and operating assets near Jemena gas pipelines' (GAS-960-GL-PL-001) identifies a maximum level of vibration of 20 mm/second which is to be measured at the nearest surface of the buried pipeline. The Construction Contractor will set a trigger alert where vibration monitoring identifies vibration at 15mm/s. At this point, construction activities will cease to minimise impact on Jemena assets. Alternative construction methods will be investigated to ensure vibration limits do not exceed 20 mm/second. Measure NV22 also identifies that where works are within the minimum working distances and considered likely to exceed the cosmetic damage objectives, construction works will not proceed unless: A different construction method with lower source vibration levels is used, where feasible Attended vibration measurements are carried out at the start of the works to determine the risk of exceeding the vibration objectives.	Section 5.6.2 Appendix B

Jemena was also engaged in September 2023 for further consultation on the updated CNVMP in response to changes of NCAs. A summary of the issues raised by Jemena and how they have been addressed is detailed below.

Section Reference	Comment	TfNSW Response	Section Amended
N/A	No comment received.	N/A	N/A



Penrith City Council

This section details the engagement and response from PCC regarding the CNVMP prior to submission for approval and a summary of how the issues have been addressed.

A summary of the issues raised by PCC and how they have been addressed during initial consultation is detailed below.

Section Reference	Comment	TfNSW Response	Section Amended
N/A	No comment received.	N/A	N/A

PCC was also engaged in September 2023 for further consultation on the updated CNVMP in response to changes of NCAs. A summary of the issues raised by PCC and how they have been addressed is detailed below.

Section Reference	Comment	TfNSW Response	Section Amended
N/A	No comment received.	N/A	N/A



Liverpool City Council

This section details the engagement and response from LCC regarding the CNVMP prior to submission for approval and a summary of how the issues have been addressed.

A summary of the issues raised by LCC and how they have been addressed during initial consultation is detailed below.

Section Reference	Comment	TfNSW Response	Section Amended
N/A	No comment received.	N/A	N/A

LCC was also engaged in September 2023 for further consultation on the updated CNVMP in response to changes of NCAs. A summary of the issues raised by LCC and how they have been addressed is detailed below.

Section Reference	Comment	TfNSW Response	Section Amended
Section 5.3	The document proposes that constructions works shall occur from 7am – 6pm Monday to Friday and from 8am – 6pm Saturday whenever possible and at no time on Sundays or Public Holidays. The document specifies that it shall comply with the requirements of the Interim Construction Guideline, but this recommends that works should only occur from 8am – 1pm on Saturdays. It is recommended that these hours be applied on Saturdays. Given that some works are proposed to occur outside of recommended standard hours and during sensitive nighttime periods, standard hours for Saturdays of 8am - 1pm provides residents and affected properties some reprieve.	Condition of Approval (CoA) E34 of the Infrastructure Approval (SSI-9364) allows works to be undertaken from 8:00am and 6:00pm on Saturdays. As per M12 CoA E35, highly noise intensive works are not permitted after 1pm on Saturdays.	No update to documents proposed
Section 9.3	Section 9.3 covers the need for a complaints management system (CMS) to document the overall approach to complaints management for the project. It is important that the 24-hour telephone number to facilitate complaints as well as all other contact details for the proposed CMS are provided to all potentially affected properties at all stages of consultation and adequately advertised. This needs to be easy to find by people affected at any time and at all stages of the development e.g. google search and easily accessible on relevant websites. The option for noise and vibration	Noted. The overarching Community Communication Strategy (CCS) describes the various communication tools used to provide the community and affected residents with important information and project contact details (including the 24-hour telephone number). These tools include (but are not limited to) a social media website, a TfNSW website, local newspaper advertisements, letterbox notifications, and out of hours works agreements. All notifications to the community members include project contact	No update to documents proposed



Section Reference	Comment	TfNSW Response	Section Amended
	monitoring for affected premises should also be made clear to any potentially affected properties.	details and these details are also readily available online. All M12 notifications can be accessed online at the project website: https://www.transport.nsw.gov.au/projects/current-projects/project-documents-m12-motorway	
Section 9.4	Section 9.4 addresses noise training and awareness which will outline the process for seeking approval for out of hours works including consultation requirements should be provided to all construction staff to minimise noise impacts which will need to be monitored and enforced by staff in supervision roles. Ongoing refresher training and reminders for all staff should be required throughout the duration of the project. Continuous improvement is adequately covered under section 10.1	Noted. Section 9.4 states that personnel complete refresher training at not less than six monthly intervals. Targeted training in the form of toolbox talks or specific training will also be provided to personnel with a key role in noise and vibration management (including those undertaking noise or vibration monitoring) or those undertaking an activity with a high risk of environmental impact.	No update to documents proposed



Fairfield City Council

This section details the engagement and response from FCC regarding the CNVMP prior to submission for approval and a summary of how the issues have been addressed.

A summary of the issues raised by FCC and how they have been addressed during initial consultation is detailed below.

Section Reference	Comment	TfNSW Response	Section Amended
Section 3.1.1	Within Section 3.1.1 Legislation of the Construction Noise and Vibration Sub-plan (CNVMSP), the plan makes reference to a regulation that is no longer in force this being the Protection of the Environment Operations (Noise Control) Regulation 2008. The CNVMSP should make reference to current regulation, this being Protection of the Environment Operations (Noise Control) Regulation 2017.	This reference has been amended to correctly state 'Protection of the Environment Operations (Noise Control) Regulation 2017.'	Section 3.1.1
Section 4, Figure 4-1	-		Figure 4-1, Section 4 Appendix B



Section Reference	Comment	TfNSW Response	Section Amended
	locations, no ambient background noise monitoring was undertaken in NCA01. NCA01 is also not labelled on Figure 4-1, however from the description of the area in the CNVMSP, it is assumed that NCA01 is located east of the M7 near the suburb of Abbotsbury. The noise levels obtained from location LO1 which is located in NCA02 have been used to establish the Noise Management Levels for NCA01. Concerns are raised that the Rated Background Level (RBL) obtained for NCA02 may not accurately reflect the RBL in NCA01. Therefore it is recommended that further background noise monitoring be undertaken in areas where the noise monitoring locations and collected background noise levels may not accurately reflect the RBL of the NCA. This also applies to NCA04, being such a long catchment area which runs along the project corridor. One would assume that the RBL obtained from noise monitoring which occurred at one end (in Kemps Creek) of the NCA would be different to the background noise level at the other end of the NCA (in Cecil Park). This therefore highlighting the need for additional background noise monitoring to occur which should be	noise levels in every NCA provided representative noise monitoring is carried out in similar location. L01 was identified in the EIS to be representative of sensitive receivers near the M7 motorway (i.e. NCA01 and NCA02). L03 was identified in the EIS to be representative of the receivers in NCA04 along Elisabeth Drive. Given that noise monitoring was undertaken at similar representative locations, it is not considered necessary to undertake further unattended background noise monitoring. Further information regarding noise monitoring locations is contained in Section 4.13.1.2 of the M12 Motorway Submissions report (October 2020) Notwithstanding the above, Table 5-1 of the Construction Noise and Vibration Monitoring Program identifies that attended noise monitoring would be undertaken by the Construction Contractor prior to the commencement of construction to verify the existing noise environment (RBL and NML). This will determine whether there have been changes to the existing background noise levels since the publication of the EIS, and therefore if new RBLs and NMLs need to	



Section Reference	Comment	TfNSW Response	Section Amended
	implemented in the CNVMSP.	be calculated for each NCA.	
Section 4, Figure 4-1	It has been indicated that the sensitive noise receivers that are most affected from construction noise of the project have been identified in Section 4.1 Sensitive receivers within the CNVMSP. However, this section provides a general description of where the sensitive noise receivers are located to the Project corridor. It would be beneficial to have all the sensitive receivers including residential receivers clearly identified on Figure 4-1 to ensure they are capture in the Contractor's CNVMP.	Figure 4-1 has been updated to include all the sensitive receivers as per the EIS.	Figure 4-1
Table 4-2	When reviewing the ambient noise monitoring results present in Table 4-2, Council raises concerns on how the morning shoulder period noise levels for location LO1 and LO3 were calculated. As stated in the NSW EPA Noise Policy for Industry 2017 (NPfi), background noise levels are steadily rising in the early morning hours (5am-7am). This does not appear to be the case for the noise levels for the morning shoulder period, as the noise levels are significantly higher than the day time noise levels. (A copy of the table for reference is indicated below). Clarification shall be provided on how these morning shoulder period	Section 2.2 of the M12 Motorway Amendment Report Appendix G Noise and Vibration updated technical report (October 2020) outlines how the ambient noise surveys were conducted and analysed. The results of the noise monitoring were processed with reference to the NSW EPA Noise Policy for Industry (NPfI). The morning shoulder is defined as 6:00 am to 7:00 am Monday to Friday. The RBL was calculated using the lowest 10th percentile of LAF90, 15min dB measurements for the equivalent of at least one weeks' worth of valid data taken over the shoulder period.	N/A



Section Reference	Comment	TfNSW Response	Section Amended
	noise levels were calculated in accordance with NPfi.	The RBL determined for the morning shoulder period is representative of the morning peak hour road traffic noise. Therefore, it is higher than the daytime RBL, which is representative of the quietest periods of the day. The NML for the morning shoulder period was determined by using the lower daytime RBL. Refer Section 5.4 of the CNVMP	
Figure 4-1	The report does not contain any noise modelling maps that demonstrates the predicted worst case construction noise contours and the affected sensitive receivers. The noise modelling maps should clearly identify sensitive receivers and the predicted noise levels to be received at each receiver. The Interim Construction Noise Guideline (July 2009) states "Where many people are likely to be affected by construction noise, a map showing predicted noise contours surrounding the site may be required".	Figure 4-1 has been updated to include all the sensitive receivers as per the EIS. Noise contours have also been added for the earthworks scenario as a reference point as this generally represents the worst case scenario (excluding ancillary facility operations). The complete set of noise impact contours associated with different construction scenarios are provided in the M12 Motorway Amendment Report Appendix G Noise and Vibration updated technical report (October 2020).	Figure 4-1
Overarching Out-of- hours Work Protocol Attachment 2	The Out-of-hours Work (OOHW) Protocol includes Attachment 2 Application of OOHW Mitigation measures which lists mitigation measures to be implement during various OOHW periods. When reviewing these measures, it appears that a number of mitigation measures	The Overarching Out-of-hours Work Protocol has been prepared consistent with the TfNSW Construction Noise and Vibration Guideline (CNVG) (2016). Reference to the CNVMP Table 8 mitigation measures has been included in the amended Section 3 and	Overarching OOHW Protocol Section 3 and Attachment 2



Section Reference	Comment	TfNSW Response	Section Amended
	which are listed in Section 8 of the CNVMSP are not listed as measures to be implemented at various noise level exceedances, for example:	Overarching OOHW Protocol Attachment 2	
	"Where reasonable and feasible, receivers identified as requiring atproperty treatment for operational noise mitigation will be identified and offered treatment before construction activities begin that are likely to impact them".		
	The application of OOHW mitigation measures during various OOHW periods present in Attachment 2 of the Out-of-hours Work Protocol, should include all the reasonable and feasible noise mitigation measures as listed in Section 8 of the CNVMP		

FCC was also engaged in September 2023 for further consultation on the updated CNVMP in response to changes of NCAs. A summary of the issues raised by FCC and how they have been addressed is detailed below.

Section Reference	Comment	TfNSW Response	Section Amended
Section 9.3	It is noted that the NSW EPA will be the regulatory authority for the construction of the project subject to an Environmental Protection License. As a result, any noise complaint will need to be referred to the NSW EPA for appropriate investigation and action.	Notification to the NSW EPA would occur as a result of potential or actual environmental harm as per the POEO Act. This is detailed further in Section 6 of the OCEMP and in accordance with the Environmental Incident Classification and Reporting Procedure (Appendix A7 of the OCEMP). These documents are referenced in Section 9.6 of this document.	N/A



Appendix B – Construction Noise and Vibration Monitoring Program



Appendix B

Construction Noise and Vibration Monitoring Program

M12 Motorway June 2024



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Document control

File Name	M12PPW-ADAP-ALL-EN-PLN-000008_P_S3_CNVMP_APP_B_Monitoring	
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Approval and authorisation

Plan reviewed by:	Plan reviewed by:	
Tracey Austin	Deanne Forrest	
TfNSW Environment and Sustainability Manager	TfNSW Project Director, M12	
Date 28.06.2024	Date 28/6/2024	
Signed	Signed	

Revision history

Revision	Date	Description	
А	09/09/2020	First draft for TfNSW review	
В	01/10/2020	Response to TfNSW comments	
С	21/10/2020	Response to TfNSW comments	
D	16/07/2021	Updated with Final NSW and Commonwealth CoA	
E	06/08/2021	Response to TfNSW and ER comments	
F	26/08/2021	Response to ER comments	
G	19/10/2021	Updated following consultation	
G.02	22/11/2021	Updated to address DPIE comments	
Н	16/12/2021	Updated to address DPIE comments	

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Revision	Date	Description
1	2/12/2022	Additional design changes updates
J	13/02/2023	Response to TfNSW comments
K	19/03/2023	Response to ER comments
L	08/09/2023	Updated to address changes to NCAs
M	05/10/2023	Updated following consultation and contractor reviews
N	01/02/2024	Updated to reflect additional CAs
0	09/04/2024	Updated to address comments from TfNSW, ER and Construction Contractor
O.02	14/05/2024	Minor update to reference the data source for noise impacts
Р	06/06/2024	Update of figures, close out of comments



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Glossary/Abbreviations

Abbreviation	Expanded Text
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
AR	Amendment Report
ARSR	Amendment Report to the Submissions Report
ARSR amendment	Amendment Report Submission Report - Amendment
Attenuation	The reduction in the level of sound or vibration
BS	British Standard
СЕМР	Construction Environmental Management Plan
CNVG	Construction Noise and Vibration Guideline
CNVMP	Construction Noise and Vibration Management Sub-plan
СоА	Condition of Approval
DAWE	Former Commonwealth Department of Agriculture, Water and the Environment
dB(A)	Decibels using the A-weighted scale measured according to the frequency of the human ear.
DCCEEW	Commonwealth Department of Climate Change, Energy, Environment and Water
DEC	Former NSW Department of Environment and Conservation
DPE	Former NSW Department of Planning and Environment
DPHI	NSW Department of Planning, Housing and Infrastructure (formerly NSW DPE which has now been split into NSW DCCEEW and NSW DPHI, with all planning functions now falling to DPHI)
DPIE	Former Department of Planning, Industry and Environment
EAD	Environmental Assessment Documentation
EDC	Elizabeth Drive Connection
EES	Former Environment, Energy and Science
EHG	Environment and Heritage Group (a part of NSW DCCEEW)



Abbreviation	Expanded Text
EIS	Environmental Impact Statement
EMS	Environmental management system
Environmental aspect	Defined by AS/NZS ISO 14001:2015 as an element of an organisation's activities, products or services that can interact with the environment.
Environmental Assessment Documentation	 The set of documents that comprise the Division 5.2 Approval: Roads and Maritime Services (October, 2019) M12 Motorway, Environmental Impact Statement (EIS) Transport for NSW (October, 2020) M12 Motorway, Submissions Report (the Submissions Report) Transport for NSW (October, 2020) M12 Motorway, Amendment Report (AR) Transport for NSW (December, 2020) M12 Motorway, Amendment Report submissions report (ARSR) Transport for NSW (March, 2021) The M12 Motorway Amendment Report Submissions Report – Amendment (ARSR amendment) WSP (October, 2021) M12 Motorway – West Package Detailed Design Consistency Assessment GHD (October, 2021) M12 Motorway – Central Package Detailed Design Consistency Assessment Arcadis (June, 2022) M12 Motorway – Sydney Water Crossings Consistency Assessment Arcadis (July, 2022) M12 Motorway – Design Boundary Changes Consistency Assessment Arcadis (August, 2022) M12 Motorway – Design Boundary Changes Consistency Assessment Arcadis (August, 2022) M12 Motorway Project (M12 Central) Arcadis (September, 2023) M12 Motorway – Devonshire Road Temporary Roundabout Consistency Assessment WSP (September, 2023) M12 Motorway – Elizabeth Drive Connections Consistency Assessment TfNSW (September, 2023) M12 Motorway – Minor Consistency Assessment TfNSW (September, 2023) M12 Motorway – Minor Consistency Assessment M12 West demolition of structures as 752 Luddenham Road TfNSW (October, 2023) M12 Motorway – Minor Consistency Assessment M12 East AF9 Power Supply TfNSW (October, 2023) M12 Motorway – Minor Consistency Assessment M12 East Cecil Road Laydown Area TfNSW (October, 2023) M12 Motorway – Minor Consistency Assessment M12 East Cecil Road Laydown Area TfNSW (October, 2023) M12 Motorway – Minor Consistency Assessment M12 East Temporary Construction Signage Arcadis (December, 2023) M12 Motorway – Project (M12 East) Sites 48, 5



Abbreviation	Expanded Text
Environmental impact	Defined by AS/NZS ISO 14001:2015 as any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects.
EMM	Environmental Management Measure
Environmental objective	Defined by AS/NZS ISO 14001:2015 as an overall environmental goal, consistent with the environmental policy, that an organisation sets itself to achieve.
Environmental target	Defined by AS/NZS ISO 14001:2015 as a detailed performance requirement, applicable to the organisation or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.
EPA	NSW Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
ER	Environmental Representative
ERG	Environmental Review Group
ESM	Transport for New South Wales Environment and Sustainability Manager
ESR	Construction Contractor Environmental Site Representatives
EWMS	Environmental Work Method Statements
Feasible and reasonable	Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. Feasible relates to engineering considerations and what is practical to build. Reasonable relates to the application of judgement in arriving at a decision, taking into account mitigation benefits and cost of mitigation versus benefits provided, community views and nature and extent of potential improvements.
Highly Noise Affected	Where noise affected management level represents the level above which there may be strong community reaction to noise, determined as the exceedance of NMLs.



Abbreviation	Expanded Text
Highly Noise intensive Works	Works which are defined as annoying under the Interim Construction Noise Guideline (DECC, 2009) including:
	Use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work
	Grinding metal, concrete or masonry
	Rock drilling
	Line drilling
	Vibratory rolling
	Bitumen milling or profiling
	Jackhammering, rock hammering or rock breaking
	Impact piling.
Km	Kilometres
LAeq (15min)	The A-weighted equivalent continuous (energy average) A-weighted sound pressure level of the construction works under consideration over a 15-minute period and excludes other noise sources such as from industry, road, rail and the community.
LA (max)	the A-weighted maximum noise level only from the construction works under consideration, measured using the fast time weighting on a sound level meter.
M7 Motorway (MOD 6 Widening)	Refers to the State Significant Infrastructure project (SSI-663-MOD 6) to construct and operate an additional lane in both directions within the existing median of the M7 Motorway, south of the Kurrajong Road overhead bridge at Prestons to the M7 Motorway bridge at Richmond. This project interacts with the M12 East stage at the M7 interchange.
M7 Widening	Shorthand term for M7 Motorway (MOD 6 Widening)
	The M7-M12 Integration project incorporates the following:
	M7 Motorway (Mod 6 Widening) (SSI 663 Mod 6) – modification (mod) to the M7 Motorway approved on 17 February 2023 under Division 5.2 of the Environmental Planning and Assessment Act 1979 (EP&A Act)
M7-M12 Integration Project	M12 Motorway (CSSI 9364) – approved on 23 April 2021 under Division 5.2 of the EP&A Act and split into separate stages or packages of work (West, Central (main construction), Central (temporary roundabout) and East). The M12 Motorway is also subject to a federal approval under the Environment Protection and Biodiversity Conversation Act 1999. The M7-M12 Integration project incorporates the M12 East package only.
Monitoring Program, this	Construction Noise and Vibration Monitoring Program
NCA	Noise Catchment Areas



Abbreviation	Expanded Text
NML	Noise Management Level
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water (formerly NSW DPE which has now been split into NSW DCCEEW and NSW DPHI)
POEO Act	NSW Protection of the Environment Operations Act 1997
RBL	The Rating Background Level for each period is the medium value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period (day, evening and night)
SPL	Sound Pressure Level
SWL	Sound Power Level
TfNSW	Transport for New South Wales
VDV	Vibration dose value
WSIA	Western Sydney International Airport
WSO Co	Western Sydney Orbital Company



1 Introduction

1.1 Background

Transport for New South Wales (TfNSW) is planning to construct and operate the M12 Motorway (the Project) to provide direct access between the Western Sydney International Airport (WSIA) at Badgerys Creek and Sydney's motorway network. The M12 Motorway will run between the M7 Motorway at Cecil Hills and The Northern Road at Luddenham for about 16 kilometres (km) and is expected to be opened to traffic prior to opening of the WSIA.

The Project will be constructed in separate stages under separate construction contracts:

- M12 West between The Northern Road, Luddenham and about 250 metres east of Badgerys Creek
- M12 Central (main construction) between about 250 metres east of Badgerys Creek and the Western Sydney Parklands at Duff Road, Cecil Park
- M12 Central (Temporary Roundabout) temporary roundabout installation at Elizabeth Drive and Devonshire Road, Kemps Creek
- M12 East (as part of the M7/M12 Integration Project)
 - Elizabeth Drive Connections (EDC) a two-kilometre section from Duff Road to about 300 metres east of the M7 Motorway
 - M7/M12 Interchange An interchange between the M12 Motorway and M7
 Motorway and tie-in works for approximately four kilometres on the M7 Motorway

1.2 Scope of the program

This overarching Construction Noise and Vibration Monitoring Program (this Monitoring Program) has been developed in accordance with NSW Condition of Approval (CoA) C11(a). It describes the environmental noise and vibration monitoring activities to be undertaken by Construction Contractors for the M12 Motorway Project (the Project). The purpose of this Monitoring Program is to:

- Provide a procedure to monitor noise and vibration impacts during construction of the Project
- Meet the requirements of the CoA for the Project
- Meet any relevant legal and other requirements for the Project.

The Construction Contractors will develop a detailed stage specific Construction Noise and Vibration Monitoring Programs in accordance with this overarching Noise and Vibration Monitoring Program. The Construction Contractors will supplement this overarching Monitoring Program with stage specific information and include the updated Monitoring Program in their Construction Noise and Vibration Management Sub-plan (CNVMP).



The SMART (Specific, Measurable, Achievable, Realistic and Timely) principles have been considered in the preparation of this Monitoring Program. Refer to Section 5 for further details on how the monitoring procedures are being conducted.

1.3 Responsibilities

Site personnel or sub-contractors with suitable experience and qualifications will undertake the monitoring outlined in this Monitoring Program.

The Construction Contractors' Construction Managers are responsible for ensuring that all legal and other requirements described in this Monitoring Program are met.

1.4 Approval, review and modification

In accordance with NSW CoA C15, this Monitoring Program will be endorsed by the Environmental Representative (ER) and will be submitted to the Secretary for approval at least one month before commencement of construction.

Construction will not commence until the Planning Secretary has approved this required Monitoring Program and all relevant baseline data for the specific construction activity has been collected. This Monitoring Program, as approved by the Planning Secretary, including any minor amendments approved by the ER, will be implemented for the duration of construction and for any longer period set out in this Monitoring Program or specified by the Planning Secretary, whichever is the greater.

This Monitoring Program will be reviewed every six months by TfNSW in consultation with the Construction Contractors.

In accordance with NSW CoA C17, minor amendments to this Monitoring Program may be approved by the ER.

Any amendments to the Monitoring Program will be documented in subsequent revisions of this Monitoring Program. A copy of the updated Monitoring Program and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure outlined in the Construction Contractors' CEMPs. Site personnel with responsibilities relevant to noise and vibration monitoring will be informed of any amendments to the Monitoring Program and training provided where required.

TfNSW will review the Construction Contractors' Monitoring Programs to confirm compliance with the requirements of the CNVMP and specifications.

1.5 Consultation

The following consultation was required for the preparation of this Monitoring Program, in accordance with NSW CoA C11(a):

- Penrith City Council
- Liverpool City Council
- Fairfield City Council.



In accordance with NSW CoA C11(a), details of all information requested during consultation must be provided to the Planning Secretary as part of any submission of the Monitoring Program.

A first round of consultation was conducted with government agencies and stakeholders in 2021, prior to approval of this CNVMP. A second round of consultation was conducted with government agencies and stakeholders in response to the changes to NCAs for the M7-M12 Integration Project in September 2023. Refer to Appendix A of the CVNMP for a record of the consultation carried out during the development of this Monitoring Program.

1.6 Guidelines

The main guidelines, specifications and policy documents relevant to this monitoring program include:

- TfNSW Specification G36 Environmental Protection (Management System)
- TfNSW Construction Noise and Vibration Guidelines (Roads and Maritime 2016)
- NSW Interim Construction Noise Guideline (ICNG) (Department of Environment and Climate Change (DECC), 2009)
- NSW Road Noise Policy (Department of Environment, Climate Change and Water, 2011)
- NSW Noise Policy for Industry, Environment Protection Authority 2017
- NSW Assessing Vibration a technical guideline (AVTG) (DEC, 2006)
- Australian Standard 2659.1 1998 Guide to the use of sound measuring equipment portable sound level meters
- Australian Standard IEC 61672.1 Electroacoustic Sound Level Meters Specifications
- Australian Standard 2775 Mechanical Mounting of Accelerometers
- Australian Standard AS/NZS 2107:2000 Acoustics Recommended design sound levels and reverberation times for building interiors
- Australian Standard 2834-1995 Computer Accommodation, Chapter 2.9 Vibration
- Australian Standard AS 2187.2 Explosives Storage and use Part 2 Use of explosives
- Australian Standard 1055 Acoustics Description and Measurement of Environmental Noise
- Australian Standard AS2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites
- British Standard BS 6472-2008, 'Evaluation of human exposure to vibration in buildings (180Hz)
- British Standard 7385: Part 2-1993 'Evaluation and measurement of vibration in buildings'
- German Standard DIN4150-1999 Structural vibration Part 3: Effects of vibration on Structures.



1.7 Conditions of Approval

The NSW CoA relevant to this Monitoring Program and their applicability to each stage of the Project are listed in Table 1-1. A cross reference is also included to indicate where the condition is addressed in this Monitoring Program or other project management documents.



Table 1-1: NSW CoA relevant to the preparation of this Monitoring Program

.CoA no.	Condition	_1	Applicabilit	у	Reference
		M12 West	M12 Central	M12 East	
A46	The Planning Secretary must be notified in writing via the Major Projects website within seven (7) days after the Proponent becomes aware of any non-compliance.	✓	√	✓	Section 6.3
A47	A non-compliance notification must identify the CSSI and the application number for it, set out the condition of approval that the CSSI is non-compliant with, 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.	✓	√	√	Section 6.3
C11	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies 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: (a) Noise and Vibration	√	✓	√	Section 1.5 Appendix A of the CNVMP
C12	Details of all information requested by an agency during consultation must be provided to the Planning Secretary as part of any submission of the relevant Construction Monitoring Programs, including copies of all correspondence from those agencies as required by Condition A5.	✓	√	✓	Section 1.5
C13	Each Construction Monitoring Program must provide:	•	1		
	(a) details of baseline data available;	✓	✓	✓	Section 2
	(b) details of baseline data to be obtained and when;	✓	✓	✓	Section 2
	(c) details of all monitoring of the CSSI to be undertaken;	✓	✓	✓	Section 4
	(d) the parameters of the CSSI to be monitored;	✓	✓	✓	Section 5.1 Section 5.2



CoA no.	Condition		Applicabilit	Reference	
		.M12 West	M12 Central	M12 East	
	(e) the frequency of monitoring to be undertaken;	✓	·	✓	Section 5.1 Table 4-1 Section 5.2 Table 4-2
	(f) the location of monitoring;	✓	✓	✓	Section 5.3
	(g) the reporting of monitoring results and analysis of results against the relevant criteria;	✓	✓	✓	Section 6
	(h) details of methods that will be used to analyse monitoring data;	✓	✓	✓	Section 6.1
	(i) procedures to identify and implement additional mitigation measures where results of monitoring indicate unsatisfactory CSSI impacts;	✓	✓	✓	Section 5
	(j) a consideration of SMART principles;	✓	√	✓	Section 1.2 Section 5
	(k) any consultation to be undertaken in relation to the monitoring programs; and	√	√	√	Section 1.5 Appendix A of the CNVMP
	(I) any specific requirements as required by Condition C14.	✓	√	✓	Section 5.1 Section 5.2
C14	The Construction Noise and Vibration Monitoring Program must include, but not be limited	ed to:			
	 (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 Section 5.2
	(b) noise monitoring during the day, evening and night time periods throughout the construction period, covering the range of activities (including worst-case construction noise levels) being undertaken;	✓	√	✓	Section 5.1



.CoA no.	Condition		Applicabilit	у	Reference
		.M12 West	M12 Central	M12 East	
	(c) method and frequency for reporting monitoring results; and	✓	✓	✓	Section 6.2
	(d) procedures to identify and implement additional mitigation measures where monitoring indicates noise and/or vibration levels in excess in excess of noise and vibration criteria.	✓	√	✓	Section 5.4
C15	The Construction Monitoring Programs 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.	✓	✓	✓	Section 1.4
C16	Unless otherwise agreed with the Planning Secretary, construction must not commence until all of the relevant Construction Monitoring Programs have been approved by the Planning Secretary, and all relevant baseline data for the specific construction activity has been collected.	√	√	√	Section 1.4
C17	The Construction Monitoring Programs, as approved by the Planning Secretary, 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, whichever is the greater.	√	√	√	Section 1.4
C18	The results of the Construction Monitoring Programs must be submitted to the Plannin Secretary, and relevant government agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.		√	√	Section 6.2
E38	Mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration objectives: (a) construction 'Noise affected' NML established using the <i>Interim Construction Noise Guideline</i> (DECC, 2009);	√	~	✓	Section 3
	(b) vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure);				



CoA no.	Condition	.Aj				
		M12 West	M12 Central	M12 East		
	(c) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and					
	(d) vibration limits set out in the German Standard DIN 4150-3: Structural Vibration-effects of vibration on structures (for structural damage).					
	Any construction or early works identified as exceeding the noise management levels and/or vibration criteria must be managed in accordance with the respective Noise and Vibration CEMP Sub-plan or Early Works Environmental Management 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 NML.					
E42	The Proponent must conduct vibration testing during vibration generating activities that have the potential to impact on heritage items to identify minimum working distances to prevent cosmetic damage. In addition, vibration monitoring must be undertaken during construction for relevant remaining Fleurs Radio Telescope structures, the Upper Canal (in consultation with WaterNSW) and McMaster Farm and McGarvie-Smith Farm group of remaining buildings. 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.	√	✓	•	Section 5.2 Section 8 of the CNVMP	
E43	Advice from a heritage specialist must be sought on methods and locations for installing equipment used for vibration, movement and noise monitoring at heritage-	✓	✓	✓	Section 5.1.1 Section 5.2.1	
	listed structures.				Section 8 of the CNVMP	
E44	Before conducting at-property treatment at any heritage item identified in the documents listed in Condition A1, the advice of a suitably qualified and experienced built heritage specialist must be obtained and implemented to ensure such work does not have an adverse impact on the heritage significance of the item.	√	√	✓	Section 8 of the CNVMP	
E76	The Proponent must offer pre-construction surveys to the owners of surface and subsurface structures and other relevant assets identified at risk from vibration, including	✓	√	✓	Section 6.4	



.CoA no.	Condition	Applicability			Reference
		.M12 West	M12 Central	M12 East	
	all listed heritage items and buildings/structures of heritage significance as identified in the documents listed in Condition A1. Where the offer is accepted, the survey must be undertaken by a suitably qualified and experienced engineer and/or building surveyor prior to the commencement of vibration generating works that could impact on the structure/asset. The results of each survey must be documented in a Pre-construction Condition Survey Report and the report must be provided to the owner of the item(s) surveyed no later than one (1) month before the commencement of all other potentially impacting works.				
E77	Where pre-construction surveys have been undertaken in accordance with Condition E76, subsequent post-construction surveys of the structure / asset must be undertaken by a suitably qualified and experienced engineer and/or building surveyor to assess damage that may have resulted from the vibration-generating works. The results of the post-construction surveys must be documented in a Post-Construction Condition Survey Report for each item surveyed. The Post-construction Condition Survey Reports must be provided to the owner of the structures/assets surveyed, and no later than four (4) months following the completion of construction activities that have the potential to impact on the structure / asset.	√	✓	√	Section 6.4



1.8 Revised Environmental Management Measures

The REMMs relevant to this Monitoring Program and their applicability to each stage of the Project are listed in Table 1-2. A cross reference is also included to indicate where the requirement is addressed in this Monitoring Program or other project management documents.

Table 1-2: REMMs relevant to the preparation of this Monitoring Program

REMM	Requirement	Applica	ability		Reference
		M12 West	M12 Central	M12 East	
NV04	Monitoring will be carried out at the start of high noise and vibration activities to confirm that actual noise and vibration levels are consistent with the noise and vibration impact predictions. Where mitigation measures were included, measurements will be carried out to confirm the effectiveness. Where the monitoring identifies higher levels of noise and vibration compared to predicted levels, or where mitigation is shown to be ineffective against measured noise and vibration levels, additional mitigation measures will be identified and implemented to appropriately manage impacts where feasible and reasonable.	✓ ·	✓	√	Section 5.1 Section 5.2 Section 5.4 Section 8 of the CNVMP
NV08	Where works are within the minimum working distances and considered likely to exceed the cosmetic damage objectives (as shown in Figure 7-3 of Appendix G of the amendment report), construction works will not proceed unless: A different construction method with lower source vibration levels is used, where feasible Attended vibration measurements are carried out at the start of the works to determine the risk of exceeding the vibration objectives.	✓	✓	✓	Section 5.2 Section 8 of the CNVMP
NV10	Surveys will be carried out to confirm the existing condition of the WaterNSW Upper Canal System and Jemena high pressure gas pipelines to determine appropriate vibration criteria.	√	√	✓	Section 5.2 Section 5.4 Section 8 of the CNVMP



REMM	Requirement	Applica	bility	Reference	
		M12 West	M12 Central	M12 East	
	This will also include consideration of distances from the vibration intensive activity (piling, rock-breaking and vibratory rolling), as well as ground conditions.				
	A vibration criterion of a peak particle velocity (PPV) will be determined in consultation with the relevant utility/service providers, including WaterNSW.				
	In-situ monitoring will be carried out to confirm the vibration levels and assess the impact of vibration. Where the monitoring identifies exceedances in the relevant criteria, or where impacts are identified, additional mitigation measures will be identified and implemented to appropriately manage impacts.				
NV11	The following structures have the potential to be within the safe working distances for sensitive structures (Group 3 from DIN 4150):		√	✓	Section 5.2
	Item 1: McGarvie Smith Farm				Section 5.4
	Item 2: Fleurs Radio Telescope Site				Section 8 of the CNVMF
	Item 4: Upper Canal System				
	Item 6: McMaster Field Station				
	Item 7: Fleurs Aerodrome.				
	A detailed survey will be completed to determine the potential for vibration impacts and to define appropriate criteria for each heritage item. Vibration monitoring will be carried out when vibration intensive tasks are occurring within the minimum working distances to heritage structures. Where the monitoring identifies exceedances in the relevant criteria, or where impacts are identified, additional mitigation measures will be identified and implemented to appropriately manage impacts.				



2 Baseline Data

2.1 Noise and vibration sensitive receivers

The noise and vibration assessment in the EIS, Response to Submissions, Amendment Report and Amendment Report Submissions Report (collectively Environmental Assessment Documentation), identified and considered potential construction noise and vibration impacts for each habitable dwelling or park along the Project alignment and within 1200 m either side of the new or existing road centre line.

Sensitive receivers potentially affected by the Project are concentrated in Kemps Creek, Cecil Hills and Cecil Park in M12 East. The central and western sections of the Project area are mainly semi-rural properties with few residences.

The noise and vibration assessment in the Environmental Assessment Documentation identified and considered potential noise and vibration impacts for sensitive receivers along the Project alignment.

The location of noise and vibration sensitive receivers within the Project area are shown in Figure 2-1.

2.2 Noise catchment areas

NCAs were nominated within the Project EAD. NCAs that reflect land uses and the nature and types of receivers within each NCA were established as part of the noise assessment. The NCAs were selected to be representative of the varying land uses and noise environment of sensitive receiver locations around the Project. Figure 2-1 shows the locations and extents of the NCAs.

As discussed in Section 1.2 of the CNVMP, the M7-M12 Integration Project encompasses the M12 East stage and the M7 Widening projects. The various noise assessments for each Project were undertaken at separate times, as such, the NCAs reported between where M12 East and M7 interact where different, (noting that there are no changes to the NCAs in M12 West and Central stages). To allow for consistent management of potential noise impacts, NCA boundaries have been realigned with reference to the most appropriate NCAs relevant to each project. The selection and adjustments of NCA boundaries were determined in the technical memorandum "M7-M12 Interchange Project – Noise Catchment Area Alignment" (TN188-18F01 NCA Boundary Alignment, dated 31/07/2023, Revision 3) (Appendix F) and was undertaken using the following procedure:

- Where NCAs are defined for the M7 Widening, adopt the NCA and associated noise logging results. With reference to the M12 NCAs, where an overlap occurs between the M12 and M7 NCAs, the former would be adjusted to align with the latter
- 2. Adjust the NCA boundaries to align with logical and reasonable features (e.g. along road), where required
- 3. Subdivide NCAs near key areas of the Project, such as the M7-M12 interchange, to follow logical boundaries and consider representative background noise levels for the potentially



most noise affected receivers. New NCAs may require additional noise monitoring to establish existing background and ambient noise levels.

This methodology was proposed as the recent noise logging measurements were conducted for the M7 Widening Project and the M12 noise loggers were positioned further away from the potentially most noise-affected residences.

As a result of this assessment, the M12 NCA01, NCA02, NCA03 and NCA04 NCAs have been adjusted to allow for the representative NCA areas for the M7-M12 Integration Project. Consequently, the minimum horizontal distance, in metres, from the Project to the nearest sensitive receiver within the NCA has also changed. In particular, the original extent of NCA04 has as described in the M12 AR has been divided into NCA35 and M7_NCA17. However, for the purpose of M12 Central, where NCA35 overlaps with the M12 Central, the M12 Central Construction Contractor will utilise the NML associated with NCA04 only. The NML associated with NCA35 and M7_NCA17 would apply to M12 East only. This is because:

- The change in NCA is relevant to the noise environment and land use characteristics associated with M12 East and M7 Motorway Projects
- The existing NCA04 NML are more stringent than that developed for NCA35; as such, M12 Central would be taking a conservative approach to noise management.

There are now 18 NCAs associated with the Project; the land use characteristics within each NCA are described in Table 2-1.

It is noted that M7 NCA13, NCA20 and NCA21, which are adjacent to the M12 boundaries, are relevant only to M7 project and not considered within the context of the M12 Motorway Project construction noise impacts. Consequently, these NCAs are not displayed in Table 2-1 as they are beyond the extent of the M12 construction noise impacts.

Table 2-1: Noise catchment areas

.NCA	Minimu m distance	Description	Source
M12_NCA01	782 m	This catchment area is located east of the M7 Motorway and extends south to Elizabeth Drive. Receivers in this catchment are largely residential with the nearest receiver located 782 m to the east of the Project.	M7 Widening
M12_NCA02	544 m	This catchment area is located to the south of Elizabeth Drive and east of the M7 Motorway. It is primarily suburban residential with the nearest receivers located 544 m to the east of the Project.	M7 Widening

¹ Approximate minimum horizontal distance in metres from the project to the nearest sensitive receiver.

^{4 |} M12 Motorway OCEMP: Construction Noise and Vibration Management Sub-plan Appendix B – Construction Noise and Vibration Monitoring Program June 2024 Version P UNCONTROLLED WHEN PRINTED



NCA Minimu Description m distance 1			
M12_NCA03	239 m	This catchment area is located to the north of Elizabeth Drive and west of the M7 Motorway, extending to the west of Mamre Road. The nearest receivers are located north of the Project on Mamre Road.	M7 Widening
M12_NCA04	90 m²	This catchment area is located to the north of Elizabeth Drive and west of the M7 Motorway and extends west to the intersection of Devonshire Road and Cross Street and east to Duff Road. It is primarily residential with the nearest receivers located adjacent the Project on the north of Elizabeth Drive.	M7 Widening
M12_NCA05	60 m	This catchment area is located to the south of Elizabeth Drive and west of the M7 Motorway and extends west to Kemps Creek. It primarily consists of the Western Sydney Parklands with no residential receivers	M12 AR
M12_NCA06	70 m ²	This catchment area is located to the west of Kemps Creek and east of South Creek and extends to the north and south of Elizabeth Drive. It primarily consists of rural residential receivers.	M12 AR
M12_NCA07	100 m	This catchment area is located to the west of Kemps Creek, east of Cosgroves Creek, and north of Elizabeth Drive. This catchment primarily consists of rural residential receivers and a cluster of residential dwellings 500 metres to the north of the Project.	M12 AR
M12_NCA08	420 m	This catchment area is located along the western section of Elizabeth Drive to the west of South Creek and east of The Northern Road. This catchment is primarily rural residential and encompasses the Western Sydney International Airport project.	M12 AR
M12_NCA09	90 m	This catchment area is located to the west of Cosgroves Creek, east of The Northern Road, and north of Elizabeth Drive. It is set back from Elizabeth Drive and The Northern Road to represent receivers which are not adjacent to the existing major roads. This catchment represents mostly rural receivers.	M12 AR
M12_NCA10	160 m	This catchment area is located along The Northern Road. It is primarily rural residential with the nearest receivers located opposite the west end of the project to the west of The Northern Road.	M12 AR

² The Devonshire Road temporary roundabout works is considered temporary and localised compared to the overall Project. These works are adjacent to residential receivers but not reflected in the minimum distance to NCA04 and NCA06.



NCA	Minimu	Description	Source
	m distance		
TfNSW_NCA35	25 m	This catchment area is located north of Elizabeth Drive, about 300 m west of the M7. It is bounded by Goodrich Road and Brolen Way in the north, Duff Road in the west, and Elizabeth Drive in the south. It is primarily rural residential with some industrial facilities. The closest residential receivers are near the intersection of Elizabeth Drive and Duff Road.	TfNSW additional monitoring
TfNSW_NCA16b	12 m	This catchment is located south of Elizabeth Drive, in between the M7 and Sandringham Drive. It is primarily suburban residential, describing northwest Cecil Hills, with receivers about 12 m to 20 m away from the project works on Elizabeth Drive.	TfNSW additional monitoring
M7_NCA14	80 m	This catchment area is located east of Dobroyd Drive and west of Hinchinbrook Creek. This primarily suburban residential area describes the receivers in Elizabeth Hills not immediately adjacent to the M7.	M7 Widening
M7_NCA15	600 m	This catchment area is located east of Hinchinbrook Creek and mainly encompasses the suburban residential receivers around Cecil Hills Public School.	M7 Widening
M7_NCA16	170 m	This catchment area is located between the M7 and Dnumbral Park in Cecil Hills. It primarily consists of suburban residential receivers in western Cecil Hills.	M7 Widening
M7_NCA17	This catchment consists of receivers 300 m to 400 m away from the M7 in between Abbotsbury Drive in the north and Elizabeth Drive in the south. It consists of some rural residential receivers along Wallgrove Road which runs parallel to the M7.		M7 Widening
M7_NCA18	190 m	This catchment area starts from about 200 m west of the M7 and extends up to Arundel Road. It is bounded by Eastern Creek in the north and Ropes Creek to the south. It primarily consists of rural residential receives and some industrial facilities.	M7 Widening
M7_NCA19	490 m	This catchment area primarily includes the Western Sydney Parklands, south of Prospect Reservoir Eastern Creek and north of Elizabeth Drive. It primarily consists of the recreational receivers located in the Parklands.	M7 Widening



2.3 Existing noise environment (baseline data)

The ambient noise environment is dominated by a combination of road traffic noise in the vicinity of major roads and general environmental noise (such as wind and insects) in the more rural locations.

The rating background level (RBL) is used to determine the appropriate noise management level (NML). The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours).

Works undertaken from 1:00pm and 6:00pm on Saturday (the allowable work hours on Saturdays identified in the Infrastructure Approval) have been assessed in the Environmental Assessment Documentation as Daytime OOH.

Unattended noise surveys were completed at a number of locations across the M12 and M7 project areas to determine the RBL. Monitoring equipment for these surveys was generally located at receivers which will have line-of-sight to the Project or to existing major roads, within constraints such as accessibility, security and permission of landowners.

2.3.1 M12 Motorway

Unattended noise surveys in the Project area were conducted at 15 locations as part of the preparation of the Environmental Assessment Documentation, namely the EIS in 2017, and the Amendment Report in 2020. The measured noise levels were used to determine the existing noise environment and to set criteria to assess the potential impacts from the Project. The locations in which background noise monitoring surveys were carried out are shown on Figure 2-1.

The rating background level (RBL) is used to determine the appropriate noise management level (NML). The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours).

A summary of the noise monitoring results and adopted RBLs is provided in Table 2-2.

Table 2-2: Ambient noise monitoring results (dB(A))

.ID	Background noise (RBL) – Periods based on extended construction hours ³					Average noise (period) based Policy ⁴	
	.Morning shoulder	Day	Evening	Evening Shoulder	Night	Day 15 hour	.Night 9 hour
L01	51	45	44	46	40	52	51
L02	47	36	39	41	34	46	45

³ RBL periods are based on extended construction hours: Morning shoulder is 6:00 am to 7:00 am Monday to Friday; Daytime is 7:00 am to 6:00 pm Monday to Saturday and 8:00 am to 6:00 pm Sunday and Public Holidays; Evening is 7:00 pm to 10:00 pm Monday to Friday and 6:00 pm to 10:00 pm Saturday, Sunday and Public Holidays; Evening shoulder is 6:00 pm to 7:00 pm Monday to Friday; Night-time is 10:00 pm to 6:00 am Monday to Friday, 10:00 pm to 7:00 am Saturday and 10:00 pm to 8:00 am Sunday and Public Holidays

⁴ LA_{eq} periods are based on the Road Noise Policy: Daytime is 7:00 am to 10:00 pm; Night-time is 10:00 pm to 7:00 am.



.ID	Background noise		ed	Average noise level LA _{eq} (period) based on Road Noise Policy ⁴			
	Morning shoulder	.Day	Evening	Evening Shoulder	Night	.Day 15 hour	Night 9 hour
L03	60	54	48	56	37	66	63
L04	54	48	46	52	37	57	55
L05	49	39	42	45	35	49	48
L06	43	34	35	39	31	53	44
L07	46	40	36	42	31	56	52
L08	58	46	50	57	34	60	59
L09	56	44	48	54	36	56	55
L10	51	40	44	49	37	51	49
L11	57	46	40	51	31	69	66
L12	50	40	37	44	30	49	48
L13	50	42	38	48	33	64	60
L14	50	42	39	48	33	55	52
L15	50	39	40	47	34	52	49

Prior to the commencement of construction, the Construction Contractor will carry out additional baseline monitoring. This will determine whether there have been changes to the existing background noise levels since the publication of the EIS, and therefore if new RBLs and NMLs need to be calculated for each NCA.

2.3.2 M7 Widening

Ambient noise monitoring was undertaken at 19 locations below between 23 February and 11 March 2021 as part of the M7 Widening Environmental Impact Statement (EIS).

The locations for the unattended noise loggers were determined through examination of aerial photography and site inspections. Table 2-3 also presents the ambient LAeq levels at each monitoring location. The noise levels presented in Table 2-3 indicates that the noise environment at the measurement locations is typical of those located along major transport corridors in suburban/urban noise areas, where daytime and evening background levels are high due to heavy and continuous traffic flows. The night-time background levels tend to decrease as a result of reduced traffic flows.



Table 2-3: Ambient noise monitoring results (dB(A)) - M7 Widening

.ID	Address			e (RBL) – P constructio	eriods base on hours	ed on	Average noise level LA _{eq} (period) based on Road Noise Policy		
		Morning shoulder	Day	Evening	Evening shoulder	Night	Day 15 hour	Night 9 hour	
NL1	79 Armitage Drive, Glendenning	45	50	46	43	40	60	55	
NL2	20 Ridgeview Place, Oakhurst	41	44	41	40	38	60	48	
NL3	Lot 2, DP1033513, Glendenning	54	66	56	49	42	73	69	
NL4	Lot 671, DP740870, Glendenning	58	66	57	53	49	74	70	
NL5	Lot 5, DP1042577, Rooty Hill	61	65	60	58	56	76	71	
NL6	Lot 8, DP1042004, Horsley Park	54	60	56	52	47	67	63	
NL8	Lot 30, DP1022008, Horsley Park	56	67	60	53	45	78	74	
NL9	Lot 35, DP1021940, Cecil Park	55	65	57	51	45	70	66	
NL10	Lot 24, DP1042996, Cecil Park	52	59	54	50	45	66	63	
NL11	20 Toulouse Street, Cecil Hills	42	44	43	41	39	56	50	
NL12	Lot 24, DP1042996, Elizabeth Hills	51	57	53	49	45	70	63	
NL13	23 Lightning Ridge Road, Hinchinbrook	43	46	45	42	39	57	49	
NL14	53 Hemsworth Avenue, Middleton Grange	48	54	51	46	41	61	58	
NL15	Lot 28, DP1123873, Prestons	45	47	53 ²	48	42	57	53	



.ID	Address	.Backgrou ex	ınd nois ktended	ed on	Average noise level LA _{eq} (period) based on Road Noise Policy			
		.Morning shoulder	Day	Evening	Evening shoulder	Night	Day 15 hour	Night 9 hour
NL17	11 Skipton Lane, Prestons	49	49	54 ²	51	48	59	58
NL18	1A Burley Road, Horsley Park	49	47	51 ²	51	51 ²	55	60
NL19	Lot 13, DP1040948, Eastern Creek	55	63	55	51	47	73	69

Notes:

2.3.3 TfNSW Unattended Noise Surveys (2022)

Unattended noise surveys (Table 2-4) were undertaken around the M7/M12 interchange between 18 November to 27 November 2022 at the following two locations:

- 33 Isabel Street, Cecil Hills
- 1111 Elizabeth Drive, Cecil Hills.

The purpose of the monitoring was to determine the ambient noise environment at this location to verify and calibrate the operational noise model. The monitoring undertaken was then made available to inform the NCA alignment report (Appendix F).

Table 2-4: Ambient noise monitoring results (dB(A))

ID	Back		oise (RBL) - ed construc	- Periods base tion hours ⁵	ed on	Average noise level LA _{eq} (period) based on Road Noise Policy ⁶	
	Morning shoulder	Day	Evening	Evening shoulder	Night	Day 15 hour	Night 9 hour
33 Isabel Street, Cecil Hills (ID M2)	42	48	45	42	38	56	50

⁵ RBL periods are based on extended construction hours: Morning shoulder is 6:00 am to 7:00 am Monday to Friday; Daytime is 7:00 am to 6:00 pm Monday to Saturday and 8:00 am to 6:00 pm Sunday and Public Holidays; Evening is 7:00 pm to 10:00 pm Monday to Friday and 6:00 pm to 10:00 pm Saturday, Sunday and Public Holidays; Evening shoulder is 6:00 pm to 7:00 pm Monday to Friday; Night-time is 10:00 pm to 6:00 am Monday to Friday, 10:00 pm to 7:00 am Saturday and 10:00 pm to 8:00 am Sunday and Public Holidays

¹ Rating Background Level

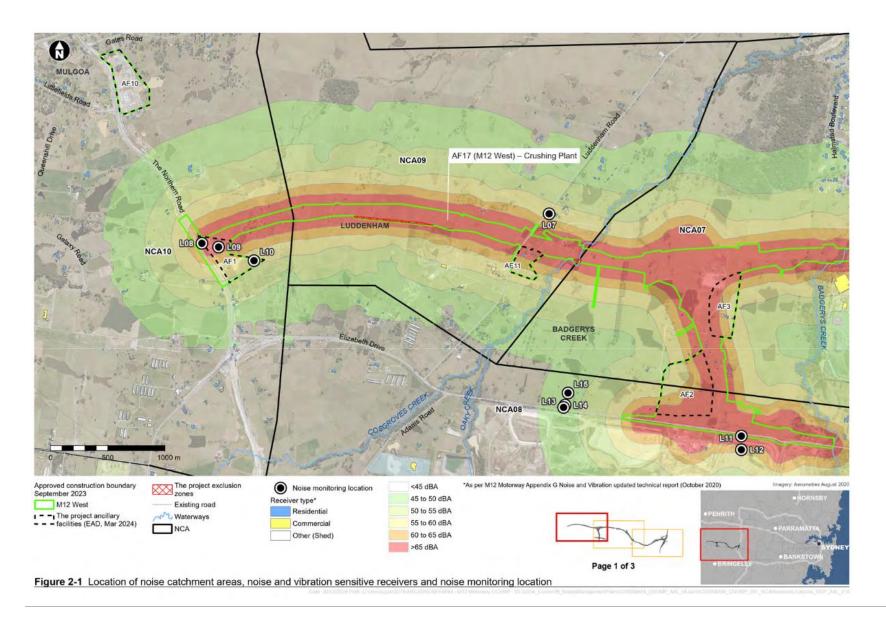
² Application notes to the Noise Policy for Industry indicate that the community generally expects a greater control of noise during the evening and night as compared to the daytime. Therefore the rating background level for the evening is set to no more than that for the daytime and the night-time to no more than the evening.

⁶ LAeq periods are based on the Road Noise Policy: Daytime is 7:00 am to 10:00 pm; Night-time is 10:00 pm to 7:00 am.



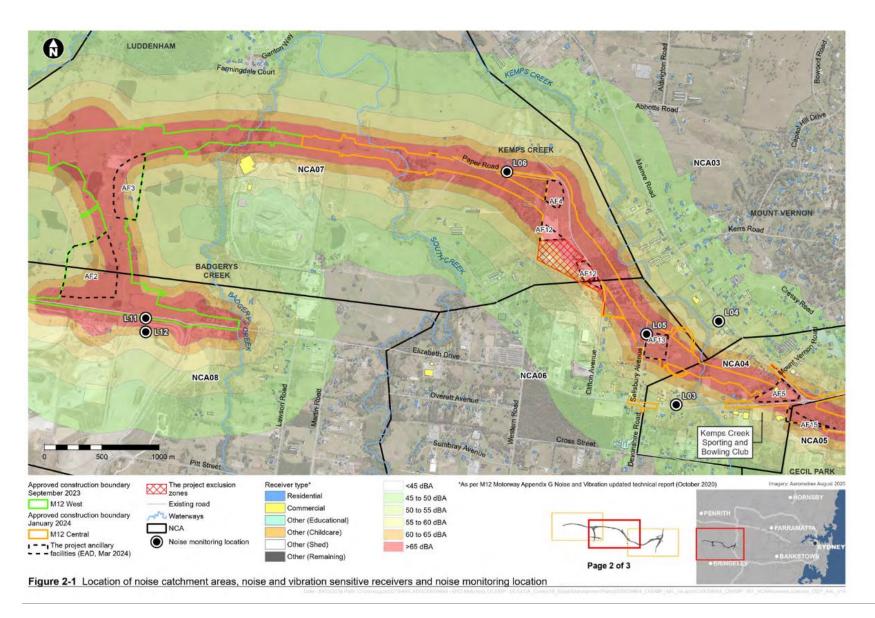
ID	.Back	ground n extend	ed on	Average noise level LA _{eq} (period) based on Road Noise Policy ⁶			
	Morning Evening				Night	Day 15 hour	Night 9 hour
Front of 1111 Elizabeth Drive, Cecil Hills (ID M3)	49	58	54	48	42	70	66





12 | M12 Motorway OCEMP: Construction Noise and Vibration Management Sub-plan Appendix B – Construction Noise and Vibration Monitoring Program June 2024 Version P UNCONTROLLED WHEN PRINTED





13 | M12 Motorway OCEMP: Construction Noise and Vibration Management Sub-plan Appendix B – Construction Noise and Vibration Monitoring Program June 2024 Version P UNCONTROLLED WHEN PRINTED



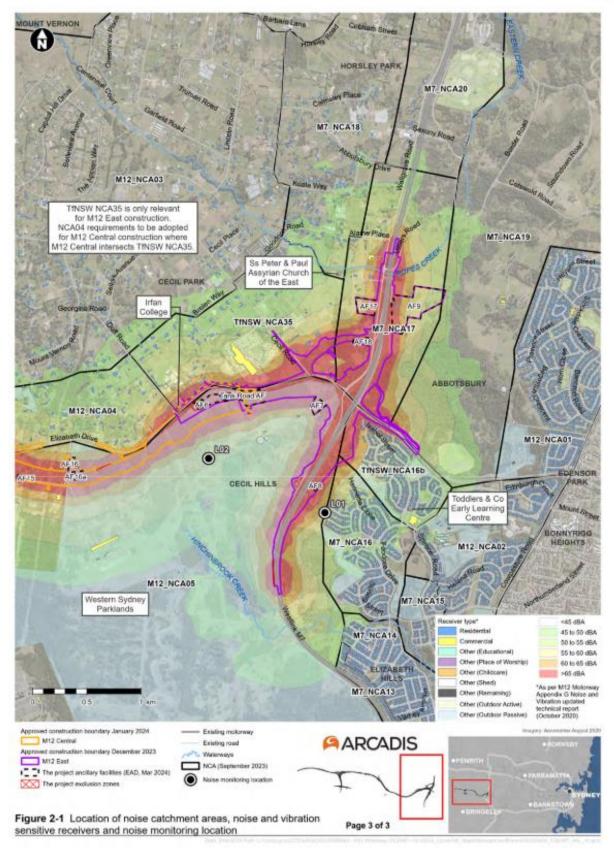


Figure 2-1: Location of noise catchment areas, noise and vibration sensitive receivers and noise monitoring locations



3 Noise and vibration criteria

3.1 Construction noise criteria

The noise criteria adopted for the Project are set out in Table 3-1 and Table 3-2.



Table 3-1: Construction NMLs and sleep disturbance screening criteria at residences

			NML LAeq(15min) (dBA)								
NCA	Monitoring location	Standard construction (RBL + 10dB)		.Out-of-hours (RBL + 5dB)							
		.Day ⁷	Morning shoulder ⁸	.Day. ⁹	.Evening. ¹⁰	.Evening shoulder. ¹¹	.Night.12	screening criteria (RBL + 15 dB)			
M12_NCA01	L01	55	50	50	49	49	45	55			
M12_NCA02	L01	55	50	50	49	49	45	55			
M12_NCA03	L05	49	44	44	44	44	40	50			
M12_NCA04	L03	64	59	59	53	53	42	52			
M12_NCA05	L02	46	41	41	41	41	39	49			
M12_NCA06	L05	49	44	44	44	44	40	50			

⁷ Daytime period is the standard construction hours of 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday

⁸ Morning shoulder period is 6:00 am to 7:00 am Monday to Friday. Where the morning shoulder RBL is higher than the daytime RBL, the daytime RBL was adopted

⁹ Daytime OOH period is 7:00 am to 8:00 am and 1:00 pm to 6:00 pm Saturday, and 8:00 am to 6:00 pm Sunday and Public Holidays

¹⁰ Evening period is 7:00 pm to 10:00 pm Monday to Friday and 6:00 pm to 10:00 pm Saturday, Sunday and Public Holidays

¹¹ Evening shoulder period is 6:00 pm to 7:00 pm Monday to Friday. Where the evening shoulder RBL is higher than the evening RBL, the evening RBL was adopted

¹² Night-time period is 10:00 pm to 6:00 am Monday to Friday, 10:00 pm to 7:00 am Saturday and 10:00 pm to 8:00 am Sunday and Public Holidays



.NCA	Monitoring location	Standard construction (RBL + 10dB)		Out-of-hours (RBL + 5dB)					
		.Day. ⁷	Morning shoulder.8	.Day. ⁹	.Evening. ¹⁰	.Evening shoulder. ¹¹	.Night.12	screening criteria (RBL + 15 dB)	
M12_NCA07	L06	44	39	39	39	39	36	46	
M12_NCA08	L14	52	47	47	44	44	38	48	
M12_NCA09	L07	50	45	45	41	41	36	46	
M12_NCA10	L09	54	49	49	49	49	41	51	
TfNSW_NCA16b	M2	58	47	53	50	47	43	53	
TfNSW_NCA35	M3	68	54	63	59	53	47	57	
M7_NCA14	NL11	54	47	49	48	46	44	54	
M7_NCA15	NL11	54	47	49	48	46	44	54	
M7_NCA16	NL11	54	47	49	48	46	44	54	
M7_NCA17	NL9	75	60	70	62	56	50	60	
M7_NCA18	NL18	57	52	52	52	52	52	66	
M7_NCA19	NL18	57	52	52	52	52	52	66	



Table 3-2: Construction NMLs for non-residential receivers

Land use	Noise assessment location	.NML (LAeq,15min) ³	
Classrooms at schools and other educational institutions	Internal	45	
Places of worship	internal	45	
Passive recreation areas ¹	External	60	
Active recreation areas ²	External	65	
Industrial premises	External	75	
Office, retail outlets	External	70	

Notes: 1 Passive recreation areas characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion.

² Active recreation areas are characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion.

³ Applies only when properties are being used



3.2 Construction vibration criteria

3.2.1 Disturbance to building occupants

Maximum and preferred values for continuous and impulsive vibration for the Project are defined in Table 3-3.

Table 3-3: Continuous and impulsive vibration acceleration (m/s²) 1-80 Hz

	Assessment	Preferred	d Values	Maximu	ım Values				
Location	periodP ¹	z-axis	x- and y- axis	z-axis	x- and y- axis				
Continuous vibration									
Critical areasP ²	Day or night-time	0.0050	0.0036	0.010	0.0072				
Dacidonaca	Daytime	0.010	0.0071	0.020	0.014				
Residences	Night-time	0.007	0.005	0.014	0.010				
Offices, schools, educational institutions and places of worship	Day or night-time	0.020	0.014	0.040	0.028				
Workshops	Day or night- time	0.04	0.029	0.080	0.058				
Impulsive vibration									
Critical areasP ²	Day or night-time	0.0050	0.0036	0.010	0.0072				
Davidanaa	Daytime	0.30	0.21	0.60	0.42				
Residences	Night-time	0.10	0.071	0.20	0.14				
Offices, schools, educational institutions and places of worship	Day or night-time	0.64	0.46	1.28	0.92				
Workshops	Day or night- time	0.64	0.46	1.28	0.92				

Notes: ¹ Daytime is 7.00am to 10.00pm and night-time is 10.00pm to 7.00am

Intermittent vibration impact is assessed using vibration dose values (VDVs). The VDV method is more sensitive to peaks in the acceleration waveform and makes corrections to the criteria based on the exposure duration. The acceptable VDV for intermittent vibration for the Project are defined in Table 3-4.

² Such as hospital operating theatres or precision laboratories.



Table 3-4: Acceptable vibration dose values (m/s^{1.75}) for intermittent vibration

Location	Dayt	imeP ¹	Night-timeP ¹			
	Preferred Maximum Values Values		Preferred Values	Maximum Values		
Critical areasP ²	0.10	0.20	0.10	0.02		
Residences	0.20	0.40	0.13	0.26		
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80		
Workshops	0.80	1.60	0.80	1.60		

Notes: 1 Daytime is 7.00am to 10.00pm and night-time is 10.00pm to 7.00am

3.2.2 Structural damage

British Standard (BS) 7385 has been adopted as a guide to assess the likelihood of building damage from ground vibration. BS 7385 suggests levels at which 'cosmetic', 'minor' and 'major' categories of damage. Table 3-5 sets out the BS 7385 criteria for cosmetic, minor and major damage. Where heritage structures are impacted, German Standard DIN 4150-3 vibration criteria will be applied. The criteria applicable to heritage buildings is identified in Table 3-6

Table 3-5: BS 7385 structural damage criteria

.Group	Type of structure	.Damage level	Peak component particle velocityP1P (mm/s)				
		levei	.4 – 15 Hz	.15 – 40Hz	.≥40Hz		
	Reinforced or framed	Cosmetic	50	50	50		
1	structures Industrial and heavy commercial	MinorP ²	100	100	100		
	buildings	MajorP ²	200	200	200		
	Un-reinforced or light		15 - 20	20 - 50	50		
2	framed structures Residential or light	MinorP ²	30 - 40	40 - 100	100		
	commercial type buildings	MajorP ²	60 - 80	80 - 200	200		

Notes:

² Includes operating theatres, precision laboratories and other areas where vibration sensitive activities may occur.

¹ Peak Component Particle Velocity is the maximum Peak particle velocity in any one direction (x, y, z) as measured by a tri-axial vibration transducer.

² and major damage criteria established based on BS 7385 Part 2 (1993) Section 7.4.2



Table 3-6: DIN 4150-3 vibration guideline for heritage buildings

	Guideline values for vibration velocity (mm/s)							
Type of structure	.Vibration a	t the foundation	Vibration at the horizontal					
	1 - 10 Hz	10 - 50 Hz	50 - 100 Hz P ¹	plane of the highest floor at all frequencies				
Heritage buildings	3	3 - 8	8 - 10	8				

Notes: 1At frequencies above 100 Hz the values given in this column may be used as minimum values.

Jemena guideline 'Designing, constructing and operating assets near Jemena gas pipelines' (GAS-960-GL-PL-001) identifies a maximum level of vibration of 20 mm/second which is to be measured at the nearest surface of the buried pipeline. The Construction Contractor will set a trigger alert where vibration monitoring identifies vibration at 15mm/s. At this point, construction activities will cease to minimise impact on Jemena assets. Alternative construction methods will be investigated to ensure vibration limits do not exceed 20 mm/second.

3.2.3 Safe working distances

Where vibration intensive plant such as rock breakers and vibratory rollers are used, vibration must be managed to minimise disturbance to building occupants and to avoid damage to buildings and other structures. Table 3-7 indicates the safe working distances recommended by the CNVG for typical items of vibration intensive plant that must be complied with unless otherwise approved by TfNSW.

Table 3-7: Safe working distances for vibration intensive plant (TfNSW 2019)

Plant item	.Rating/description	Safe working distance		
		Cosmetic damage (British Std 7385) – Light framed structures	Cosmetic damage (DIN 4150) Heritage and other sensitive structures	Human response (EPA's vibration guidelines)
Vibratory roller	<50 kN (typically 1-2 t) <100 kN (typically 2-4 t) <200 kN (typically 4-6 t) <300 kN (typically 7-13 t) >300 kN (typically 13-18 t) >300 kN (> 18 t)	5 m 6 m 12 m 15 m 20 m 25 m	14 m 16 m 33 m 41 m 54 m 68 m	15 m to 20 m 20 m 40 m 100 m 100 m 100 m
Small hydraulic hammer	300 kg – 5 to 12 t excavator	2 m	5 m	7 m
Medium hydraulic hammer	900 kg – 12 to 18t excavator	7 m	19 m	23 m



Plant item	.Rating/description	Safe working distance		
		Cosmetic damage (British Std 7385) – Light framed structures	Cosmetic damage (DIN 4150) Heritage and other sensitive structures	Human response (EPA's vibration guidelines)
Large hydraulic hammer	1600 kg – 18 to 34 t excavator	22 m	60 m	73 m
Vibratory pile driver	Sheet piles	20 m	50 m	100 m
Pile boring	≤800 mm	2 m (nominal)	5 m	7 m
Jackhammer	Hand held	1 m (nominal)	2 m	3 m

The safe working distances presented in Table 3-7 are indicative and will vary depending on the item of plant (particularly its power rating), local geotechnical conditions and the dominant frequency of the construction vibration levels. The cosmetic damage thresholds apply to typical light-framed residential buildings and heritage buildings and assume that construction vibration could include low frequency content with associated increased risk of cosmetic damage. Vibration monitoring is recommended to confirm the minimum working distances at specific sites. Additionally, further detailed analysis based on the frequency dependent guideline vibration levels in BS7385-2:1993 and DIN4150-3:2016 may be utilised in conjunction with site-specific measurements to derive alternative cosmetic damage objectives and minimum working distances. For heritage listed / fragile structures, specialist advice from an appropriately qualified structural engineer who is familiar with heritage structures is required to support any proposed relaxation of the initial cosmetic damage screening criterion.

In relation to human response, the safe working distances relate to continuous vibration. For most construction activities, vibration emissions are intermittent and higher vibration levels over shorter periods are acceptable. Additional assessment will be undertaken where the human response criteria are exceeded.



4 Construction noise and vibration impacts

4.1 Noise impacts

4.1.1 General construction noise

A summary of the potential impacts to receivers for each NCA from standard hours (daytime) and OOHW construction scenarios are presented in Section 7 of the CNVMP. The construction impacts presented are based on representative worst-case noise construction scenarios assuming all equipment operates concurrently and that equipment is located at the closest point to receivers specific to the M12 Motorway.

The construction noise modelling undertaken for the assessment identified several sensitive receivers as being subject to levels that exceed the Highly Noise Affected criteria (>75 dB(A)). Appendix G of the ARSR provides a detailed prediction of construction noise at these sensitive receivers.

Activities that are predicted to exceed the NMLs are listed in Section 7 of the CNVMP. Generally, construction work will be undertaken in standard construction hours whenever practicable. Some activities, such as bridgeworks, paving and operation of ancillary facilities may occur outside of standard of hours in accordance with the requirements of NSW CoA E36 and the EPL.

4.1.2 Ancillary facilities noise

Temporary ancillary facilities required for the Project will include compounds and laydown areas. The final type, location and number of ancillary facilities (except for minor ancillary facilities) will be identified in the Construction Contractors' Site Establishment Management Plans (SEMP), prepared in accordance with NSW CoA A16. The SEMP will include mitigation measures to minimise the potential impact from noise on sensitive receivers located within the vicinity of the ancillary facility.

Any additional ancillary facilities identified for the Project that have not been assessed in the Environmental Assessment Documentation will be assessed in accordance with the criteria in NSW CoA A15, using the ancillary facilities assessment provided in Appendix A4 of the OCEMP.

4.1.3 Construction traffic

Construction traffic will access construction sites using only designated heavy vehicle routes such as the M7 Motorway, Elizabeth Drive and The Northern Road. The assessment of construction traffic noise in the Environmental Assessment Documentation concluded that no noticeable increases in road traffic noise are predicted where construction vehicles use major roads.

4.2 Vibration impacts

4.2.1 Residents and buildings

Vibration impacts to residents and buildings are expected during construction of the Project. The main sources of vibration during construction of the Project will be associated with the use of vibratory rollers and rock breakers. 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 and attended vibration measurements will be required at the start of the works to determine the risk of exceeding the vibration objectives.

The distance between the construction works and the nearest sensitive receivers is generally sufficient for most buildings not to suffer cosmetic damage. However, about 21 structures spread across all Project stages where receivers are located close to the works are located within the recommended minimum working distance.

Where works are within the minimum working distances, and considered likely to exceed the cosmetic damage objectives, construction works will not proceed unless:

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

Certain receivers which are near the construction footprint are within the human comfort minimum working distance and occupants of affected buildings may be able to perceive vibration impacts at times when vibration generating equipment is in use. Where impacts will be perceptible, they will likely only be apparent for relatively short durations when equipment such as rock-breakers or vibratory rollers are in use nearby.

4.2.2 Heritage items

Detailed heritage assessments carried out for the Project as part of the EIS identified nine heritage items as being potentially impacted by vibration:

- McGarvie-Smith farm
- The Fleur radio telescope site
- Luddenham Road alignment
- Cecil Park school, post office and school church
- Exeter farm archaeological site
- South Kemps and Badgerys Creek confluence weirs scenic landscape
- McMasters field station
- Fleurs Aerodrome
- Upper Canal System.

Where these heritage structures are located within or near the project boundary, they may be susceptible to vibration impacts associated with construction equipment if they are operating within the safe working distance for heritage sensitive receivers.



5 Monitoring Procedures

5.1 Noise monitoring

The overarching noise monitoring procedure to be adopted for the Project is provided in Table 5-1. Noise monitoring will be undertaken by the Construction Contractor's Environmental Site Representatives (ESR) who will be appropriately trained in the measurement and assessment of construction noise and vibration and has working knowledge of the requirements of AS 2659.1.

All noise monitoring will be undertaken in accordance with Australian Standard AS 2659.1 – 1998: "Guide to the use of sound measuring equipment – portable sound level meters", or any revisions of that standard which may be made by Standards Australia, and the compliance monitoring guidance provided in the "NSW Noise Policy for Industry" (EPA, 2017). The Construction Contractor ESR will undertake noise monitoring as directed by an authorised officer of the EPA.

Subject to property owner approval, noise monitoring will be conducted at representative residential and other locations (including at the worst- affected residences) to confirm construction noise levels. The Interim Construction Noise Guideline (DECC, 2009) states that noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 metres above ground level. If the property boundary is more than 30 metres from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 metres of the residence.

Table 5-1: Noise monitoring procedure

quency _T	est procedure
to the mencement onstruction	Surveys to be carried out at the 15 locations identified in the Environmental Assessment Documentation
•	Monitoring equipment to be located at receivers which would have line-of-sight to the Project or to existing major roads
•	Noise monitoring equipment will continuously measure existing noise levels in 15-minute periods during the daytime, evening and night-time periods for the survey period. All equipment must carry current National Association of Testing Authorities (NATA) or manufacturer calibration certificates
sion of ities for h a NVIS been	ne testing method includes: Sound level meter configured for "Fast" time weighting and "A" frequency weighting Sound level meter height set at around 1.5 m above ground level The test environment will be free from
i	sion of ties for a NVIS



Monitoring details	Frequency	_Test procedure	
Attended OOHW noise monitoring at sensitive receivers during evening, night and OOH (weekends/bublic holidays) As required during OOHW		reflecting objects where possible. Where the noise monitoring is conducted within 3.5 metres of large walls or a building facade, then a reflection correction of up to -2.5 dB(A) will be applied to remove the effect of increased noise due to sound reflections from such structures	
Attended monitoring where a complaint is received and monitoring is considered an appropriate response to determine if noise levels exceed predicted 'worst case' Construction noise levels documented	Related to noise complaint	 Tests will not be carried out during rain or when the wind speed at the test site exceeds 5 m/s Conditions such as wind velocity, wind direction, temperature, relative humidity and cloud cover will be recorded. These may be obtained from the nearest Bureau of Meteorology monitoring station or on-site weather station/observations 	
Attended monitoring to confirm noise levels are no more than 5 dB(A) above night time RBL levels using the LAeq (15min) descriptor for works undertaken in accordance with NSW CoA E36(b)(i) Noise monitoring at nonsensitive receivers predicted to be impacted by moderate exceedances of the NML from work in standard hours	On each occasion works undertaken in accordance with NSW CoA E36(b)(i) on each occasion it is used. As required	 The monitoring period should be sufficient such that the measured noise levels are representative of the noise over a 15-minute period Selected monitoring periods should vary to cover the range of activities being undertaken, including the worst-case construction scenario At a minimum Leq, Lmax, L₁₀ and L₉₀ levels will be measured and reported If any noise intensive equipment is used, they should be factored into the quantitative assessment by adding 5 dB(A) to the predicted levels. The attended noise monitoring data will be compared to the NMLs presented in Section 3 and predicted noise levels. Observations will also be reported including audibility of construction noise, other noise in the environment and 	
Attended plant and equipment monitoring on arrival of new plant and equipment	Within 14 days of plant and/or equipment arriving at site and repeated every three months	 construction noise, other noise in the environment and any discernible construction activities contributing to noise at the receiver. The test procedure for construction plant will be guide by the stationary test procedures according to Austra Standard AS 2012.1. Sound level meter configured for "Fast" time weighting and "A" frequency weighting The test environment will be free from reflecting objects Tests will not be carried out during rain or when the wind speed at the test site exceeds 5 m/s Attended monitoring will be undertaken at plant and equipment within a period of 14 days of plant and equipment arriving on site to ensure operating not 	



Monitoring details	Frequency	_Test procedure	
		levels of all plant items comply with the maximum levels detailed in the CNVG (TfNSW, 2016).	
		Monitoring will be repeated on a three monthly basis during construction to ensure that noise from individual plant and equipment items are still within the acceptable noise range.	
Spot checks of noise intensive plant where it is required to check the noise	intensive piece of equipment commences by the stationary test procedures Standard AS 2012.1. • Sound level meter configured	The test procedure for construction plant will be guided by the stationary test procedures according to Australian Standard AS 2012.1.	
emission from the plant against manufacturer's specifications		Sound level meter configured for "Fast" time weighting and "A" frequency weighting	
Where required for the purposes of refining construction methods or techniques to reduce noise levels	As required	 The test environment will be free from reflecting objects Tests will not be carried out during rain or when th wind speed at the test site exceeds 5 m/s. 	
Real time (unattended) monitoring	As required	Refer to Section 5.1.2	
Validation monitoring	At least the first two nights of OOHW	For any works that are the subject of a community agreement under the EPL on at least the first two nights where OOHW will be undertaken in accordance with the community agreement. If validation monitoring shows that noise levels are higher than those predicted by any noise modelling undertaken as part of the community agreement, work practices will be modified so that measured noise levels do not exceed predicted levels.	

Where actual noise levels exceed the predicted worst case levels, 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.

Details of site activity and equipment usage will be noted during construction noise monitoring.

5.1.1 Noise monitoring equipment

All monitoring will be undertaken by competent personnel, suitability trained and experienced in undertaking noise measurements. 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.

Advice from a heritage specialist will be sought on methods and locations for installing equipment used for noise monitoring at heritage-listed structures.



Acoustic instrumentation employed in the noise monitoring surveys will carry current manufacturer conformance certificates and comply with the guidelines identified in Section 1.6.

5.1.2 Real time noise monitoring

Real-time (unattended) noise monitoring may also be undertaken to provide useful indications of noise exceedances, particularly during highly intensive noise activities. Real-time noise monitoring would only be used as a backup for attended noise monitoring and will not be used alone.

If unattended noise monitors (with the ability to provide levels in real time) are used, they will be installed by a suitability qualified person.

Monitoring will also be undertaken by a suitability qualified person who is appropriately trained in the measurement and assessment of construction noise and vibration and who is familiar with the requirements of the relevant standards and procedures.

5.2 Vibration monitoring

The overarching vibration monitoring procedure to be adopted for the Project is provided in Table 5-2. The Construction Contractor's ESR will be trained to undertake vibration monitoring for the duration of construction. Dilapidation surveys will be the responsibility of the Construction Contractor Managers.

All vibration monitoring will be undertaken in accordance with the technical guidance provided in the "*Environmental Noise Management - Assessing Vibration: a technical guideline*" (DEC, 2006). Vibration monitoring results may be assessed and reported against the acceptable values of human exposure to vibration set out in Tables 2.2 and Table 2.4 of the guideline.

Subject to property owner approval, vibration monitoring will be conducted at representative residential and other locations (including at the worst- affected residences) to confirm construction vibration levels.

Table 5-2: Vibration monitoring procedure

Monitoring details	Frequency	_Test procedure	
At the commencement of vibratory compaction work within 50 m of residential buildings	As required	Attended vibration monitoring will be undertaken when checking the safe working distances from construction plant or in response to a complaint. The testing method includes:	
Where a complaint is received in relation to human exposure to vibration levels and monitoring is considered an appropriate response	As required	 Transducer to be affixed to ground or building in general accordance with AS 2775- 2004 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 a complaint is received in relation to suspected property damage due to vibration impacts and monitoring is considered an appropriate response	As required	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	



Monitoring details	Frequency	_Test procedure	
Where an activity may occur within safe working distances for cosmetic damage for no more than one day continuously Where required for the purposes of refining Construction methods to reduce vibration levels	As required As required	 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 PPV with sufficient temporal resolution to determine vibration impacts 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 then a metric which is appropriate for calculating vibration does 	
Where an activity may occur within safe working distances for cosmetic damage for a period of more than one day continuously	As required	values. Continuous vibration monitoring will be undertaken in situations where there is a risk that vibration from a particular construction activity may exceed the cosmetic damage criteria at a sensitive structure. This will be where activities may occur within the safe working distances for cosmetic damage identified in Section 3.2 of this Monitoring Program.	
		The testing method includes: Transducer to be affixed to ground or building in	
		general accordance with AS 2775- 2004	
		Vibration logger to continuously measure vibration levels while the relevant works are occurring within the safe working distance for cosmetic damage	
		Measurement to be conducted as close as possible to the sensitive structure.	
		A warning system will be implemented with the monitoring system including one or both of the following:	
		 Audible and/or visual warning alarm 	
		 SMS and/or email alerts to site personnel. 	
		PPV with sufficient temporal resolution to determine vibration impacts 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 then a metric which is appropriate for calculating vibration does values.	
Vibration testing for vibration generating activities that	As required	Identify minimum working distances to prevent cosmetic damage	
have the potential to impact on heritage items		When conducting at-property treatment at any heritage item, the advice of a suitably qualified and experienced built heritage specialist will be obtained and implemented to ensure such work does not have an adverse impact on the heritage significance of the item.	
Vibration monitoring for remaining Fleurs Radio Telescope structures, the	As required	Identify minimum safe working distances by completing a desktop assessment of planned works	



Manitania a dataila	E	Test were done
Monitoring details	Frequency	_Test procedure
Upper Canal (in consultation with WaterNSW) and		Undertake attended monitoring at the commencement of works to verify and establish safe working distances
McMaster Farm and McGarvie-Smith Farm group of remaining buildings		Determine site-specific requirements, set up exclusion zones as required and toolbox the requirements to relevant personnel
		In the event that the vibration testing and attended vibration monitoring shows that the preferred values for vibration are likely to be exceeded, the construction methodology will be reviewed and, if necessary, additional mitigation measures will be implemented.
·		At a minimum, dilapidation surveys and reports will comprise:
where construction works undertak occurs within the safe and post	undertaken and post- Construction	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 building Condition Survey Report outlining the condition of the internal and external components of each property
		A series of photographs of each identified defect/crack
		A sketched floor plan showing the exact location of each 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).

Where vibration is found to exceed safe levels, impacts will be reduced by changing work methods and / or equipment, or through the provision of building protection measures where possible. In the event that a complaint relating to property damage is received, an inspection of the property will be undertaken and an interim building condition survey prepared.

Attended vibration monitoring will be undertaken to determine site-specific minimum working distances for structural damage and human response. Site-specific minimum working distances will be determined whenever significant vibration generating plant will be working close to or within the recommended minimum working distances listed in Table 5-3.

Details of site activity and equipment usage will be noted during monitoring.



Table 5-3: Recommended minimum working distance for vibration intensive plant

		Safe working distance		
Plant item	Rating/description	Cosmetic damage (British Std 7385) – Light framed structures	Cosmetic damage (DIN 4150) Heritage and other sensitive structures	Human response (EPA's vibration guideline)
Vibratory roller	<50 kN (typically 1-2 t) <100 kN (typically 2-4 t) <200 kN (typically 4-6 t) <300 kN (typically 7-13 t) >300 kN (typically 13-18 t) >300 kN (> 18 t)	5 m 6 m 12 m 15 m 20 m 25 m	14 m 16 m 33 m 41 m 54 m	15 m to 20 m 20 m 40 m 100 m 100 m 100 m
Small hydraulic hammer	300 kg – 5 to 12 t excavator	2 m	5 m	7 m
Medium hydraulic hammer	900 kg – 12 to 18t excavator	7 m	19 m	23 m
Large hydraulic hammer	1600 kg – 18 to 34 t excavator	22 m	60 m	73 m
Vibratory pile driver	Sheet piles	20 m	50 m	100 m
Pile boring	≤800 mm	2 m (nominal)	5 m	7 m
Jackhammer	Handheld	1 m (nominal)	2 m	3 m

5.2.1 Vibration monitoring equipment

The Construction Contractors will identify the vibration monitoring equipment to be used and a maintenance/calibration program to ensure equipment is implemented. Monitoring methods and instrumentation employed in the vibration monitoring surveys will comply with AS2775.2004 Mechanical vibration and shock—Mechanical mounting of accelerometers and AS2670.1 Evaluation of human exposure to whole body vibration.

Advice from a heritage specialist will be sought on methods and locations for installing equipment used for vibration monitoring at heritage-listed structures.

5.3 Noise and vibration monitoring locations

The locations of noise and vibration sensitive receivers are shown in Figure 2-1. The Construction Contractors will review and identify the locations for monthly noise and vibration monitoring in the



risk assessment workshop to be held prior to the commencement of construction and confirm the locations for noise and vibration monitoring in the stage specific Monitoring Programs.

Noise monitoring locations will include representative sensitive receivers in each NCA relevant to the Project stage. Noise monitoring will also be undertaken for non-sensitive receivers predicted to be impacted by moderate exceedances of the NML from work in standard hours.

Vibration monitoring will be undertaken at vibration sensitive locations within the 'minimum working distances' established for each item of plant during the commencement of use of each plant on site.

Attended noise and vibration monitoring locations will include construction sites where the commencement of operation for each new plant or activity on site has the potential to generate significant noise or vibration levels. This may also include specific attended noise and/or vibration monitoring of significant plant items, such as earthmoving plant.

5.4 Adaptive management

This section outlines the procedures to identify and implement additional mitigation measures where monitoring indicates noise and/or vibration levels in excess in excess of noise and vibration criteria.

Should noise and vibration monitoring results directly attributable to the Project exceed the criteria set out in Section 3 of this Monitoring Program, the following steps will be undertaken:

- Analysis of the results by the Construction Contractor ESR in more detail with a view of determining possible causes for the exceedance
- Site inspection by the Construction Contractor's ESR
- Advising relevant personnel of the problem
- Identifying and agreeing on actions and/or additional mitigation measures to resolve or mitigate the exceedance
- Implementing actions to rectify or mitigate the exceedance, including stop work arrangements where necessary or if directed by the ER
- Identifying and implementing additional mitigation measures.

Where actual noise levels are found to exceed the predicted worst case levels, 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. Where necessary, monitoring will be implemented to follow-up on any noise and vibration issues that arise during construction.

Where vibration is found to exceed safe levels, impacts will be reduced by changing work methods and / or equipment, or through the provision of building protection measures where possible. In the event a complaint relating to property damage is received, an inspection of the property will be undertaken and an interim building condition survey prepared.

Mitigation measures and preventative / corrective actions will be developed in accordance with TfNSW specifications and the procedure for dealing with non-compliance with environmental



management measures outlined in Section 7.3 of the OCEMP. The Construction Contractors will be required to verify and document the effectiveness of any management measures or preventative / corrective actions implemented to avoid further exceedances.

The timing for any improvement will be agreed between the relevant Construction Contractor Project Engineer/Superintendent and TfNSW Project Manager and SEO (or delegate) based on the level of risk or reoccurrence of the exceedance (e.g. a significant risk will require immediate action).



6 Reporting

6.1 Monthly Environmental Report

The Construction Contractors will prepare Monthly Environmental Reports for the duration of the Project for incorporation in Project Monthly Reports and submission to the Transport for NSW Environment and Sustainability Manager (ESM) (or delegate) for review. It will also be provided to the ER for information.

Information to be detailed in the reports includes:

- Results summary and analysis of the environmental monitoring
- Performance of this Monitoring Program
- Summary of complaints received that are related to noise and vibration.

The monitoring data will be collected and analysed prior to the preparation of the report. The monitoring data will be compared with the NML and vibration criteria. Following this, a Construction Noise and Vibration Monitoring Report will be prepared.

Refer to Section 7.2 of the OCEMP for further detail on environmental reporting.

6.2 Construction Noise and Vibration Monitoring Report

The Construction Contractor will prepare Noise and Vibration Monitoring Reports detailing the results of the monitoring undertaken in accordance with this Monitoring Program. The Noise and Vibration Monitoring Reports will be undertaken as soon as the first noise and vibration monitoring event takes place during construction.

The results of the monitoring will be collected in the form of a Construction Monitoring Report. The Monitoring Reports will be submitted to the Planning Secretary and to relevant regulatory agencies for information in accordance with NSW CoA C18. The Construction Monitoring Reports will be submitted quarterly until commencement of operation.

Reports will include, but not be limited to, the following information:

- The date(s) and time at which the monitoring was undertaken
- The locations and description of monitoring undertaken
- The name of the person who undertook the monitoring
- Tabulations of monitoring data
- Compliance monitoring results with the criteria identified in Section 3 of this Monitoring Program
- Identification of exceedances of the nominated criteria and descriptions of the causes of these exceedances
- Details of any alteration to the Monitoring Program
- Summary of any complaints received regarding noise and vibration.



The Construction Contractors will maintain accurate records of all noise and vibration monitoring activities

6.3 Reporting on non-conformances and exceedances

In the event that the criteria identified in Section 3 of this Monitoring Program are exceeded, the Construction Contractor will investigate and report the exceedance to the TfNSW Project Manager, TfNSW ESM (or delegate) and the ER within seven days of identification of the exceedance. Details of exceedances will be provided in the Monthly Environmental Reports and quarterly Construction Monitoring Reports.

The investigation into the exceedance will determine if the exceedance is related to Project activities or noise from another source. If the exceedance is attributed to Project activities, the exceedance will be classified as a non-compliance, incident or reportable event as defined by the M12 Environment Incident Classification and Reporting Procedure (Appendix A7 of the OCEMP).

In accordance with NSW CoA A46, the Planning Secretary must be notified in writing via the Major Projects website within seven days after TfNSW becomes aware of any non-compliance.

As required by NSW CoA A47, a non-compliance notification must identify the Project and the application number for it, set out the CoA that the Project is non-compliant with, 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.

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 outlined in NSW CoA A44 and A45.

6.4 Pre and Post Construction Surveys

Pre-construction surveys will be completed by a suitably qualified and experienced engineer and/or building survey for owners of surface and subsurface structures (including but not limited to utility assets and heritage items and building/structures of heritage significance) that are identified at risk from vibration, if the offer is accepted in accordance with NSW CoA E76. The Pre-Construction Survey will be completed prior to the commencement of vibration generating works that could impact the structure.

The results of the surveys will be documented in a Pre-construction Surveys Report for each building and structure surveyed. Copies of Building Condition Survey Reports will be provided to the owner of the structures/assets surveyed no later than four months following the completion of construction activities that have the potential to impact on the structure / asset.

After the completion of the works, a suitably qualified and experienced engineer and/or building surveyor will undertake a subsequent post-construction survey of the structure / asset in accordance with NSW CoA E77. The results of the post-construction surveys will be documented in a Post-Construction Condition Survey Report for each item surveyed. The Post-construction Condition Survey Reports will be provided to the owner of the structures/assets surveyed, and no



later than four months following the completion of construction activities that have the potential to impact on the structure / asset.

6.5 Complaints management and reporting

Recording and reporting of complaints will be undertaken in accordance with the Complaints Management System for the Project (refer to Section 5.5 of the OCEMP).



Appendix C – Overarching Out of Hours Work Protocol



Appendix C

Overarching Out-of-Hours Work Protocol

M12 Motorway
June 2024



Document control

File Name	M12PPW-ADAP-ALL-EN-PLN-000008_P_S3_CNVMP_App_C_OOHW Appendix C: Overarching OOHW Protocol	
Title	M12 Motorway OCEMP	
	Construction Noise and Vibration Management Sub-plan	
	Appendix C: Overarching Out of Hours Work Protocol	
Document Number	M12PPW-ADAP-ALL-EN-PLN-000008	

Approval and authorisation

Protocol reviewed by:	Protocol reviewed by:	
Tracey Austin M12 Manager Environment and Sustainability – TfNSW	Deanne Forrest M12 Project Director – TfNSW	
Date: 28.06.2024	Date: 28/6/2024 .	
Signature:	Signature:	

Revision history

Revision	Date	Description
Α	18/10/2021	First draft for review
В	19/10/2021	Issued for approval
С	30/10/2021	Updated to address DPE comments
D	01/11/2021	Updated following ER review
E	11/04/2022	Edits to address corrective action following environmental events on site
F	16/05/2022	Edits following internal review and ER feedback
G	23/05/2022	Edits to facilitate main civil contractors utilising this protocol
Н	06/07/2022	Address DPE comments
1	10/08/2022	Minor amendments to Section 2 and Attachment 2
J	13/02/2023	Response to TfNSW comments
К	19/03/2023	Response to ER comments



Revision	Date	Description
L	08/09/2023	Updated in response to M12 East updates
M	04/10/2023	Updated following consultation and contractor reviews
N	01/02/2024	Updated to reflect additional CAs
0	09/04/2024	Updated to address comments from TfNSW, ER and Construction Contractor
O.02	14/05/2024	Minor update to reference the data source for noise impacts
Р	06/06/2024	Update of figures, close out of comments



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Glossary/ Abbreviations

Abbreviations	Expanded Text	
ABL	Assessment Background Level	
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far	
ARSR	Amendment Report to the Submissions Report	
Attenuation	The reduction in the level of sound or vibration	
AVTG	Assessing Vibration – a technical guideline (DEC 2006)	
CEMP	Main civil contractors Construction Environmental Management Plan	
CMS	Complaints Management System	
CNVG	Construction Noise and Vibration Guideline (Roads and Maritime 2016)	
CoA	Condition of Approval	
Construction	Includes all activities required to construct the CSSI as described in the documents listed in Condition A1, including commissioning trials of equipment and temporary use of any part of the CSSI, but excluding Low Impact Work which is carried out to complete prior to the approval of the CEMP, works approved under a Site Establishment Management Plan, demolition of acquired residential houses, structures and sheds, and works specified in Appendix B and approved under an environmental management plan(s) in accordance with Condition A24.	
Contractors	Contractors engaged by TfNSW or utility authorities to undertake works for the M12 Motorway project as approved through Environmental Management Plans under NSW CoA A24,C1, and C4. This also includes Contractors' subcontractors.	
CSSI	Critical State Significant Infrastructure	
DAWE	Former Commonwealth Department of the Water, Agriculture and Environment	
DCCEEW	Commonwealth Department of Climate Change, Energy, Environment and Water	
dBA	Decibels using the A-weighted scale measured according to the frequency of the human ear	
DEC	Former NSW Department of Environment and Conservation	
DECC	Former NSW Department of Environment and Climate Change	
DECCW	Former NSW Department of Environment, Climate Change and Water	
DPE	Former NSW Department of Planning and Environment	



Abbreviations	Expanded Text	
DPHI	NSW Department of Planning, Housing and Infrastructure (formerly NSW DPE which has now been split into NSW DCCEEW and NSW DPHI, with all planning functions falling to DPHI)	
DR	Duration Respites	
EHG	Environment and Heritage Group (former Environmental, Energy and Science)	
EIS	Environmental Impact Statement	
Emergency works	Work required to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm.	
EMM	Environmental Management Measure	
EMS	Environmental Management System	
EP&A Act	Environmental Planning and Assessment Act 1979	
EPA	NSW Environment Protection Authority	
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999	
EPL	Environment Protection Licence	
ER	Environmental Representative	
ESM	Transport for New South Wales Environment and Sustainability Manager	
ESR	Construction Contractor Environmental Site Representative	
EWMS	Environmental Work Method Statements	
EWEMP	Early Works Environmental Management Plan	
Feasible and reasonable	Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. Feasible relates to engineering considerations and what is practical to build. Reasonable relates to the application of judgement in arriving at a decision, taking into account mitigation benefits and cost of mitigation versus benefits provided, community views and nature and extent of potential improvements	
Highly Noise Affected	Where noise affected management level represents the level above which there may be strong community reaction to noise, determined as the exceedance of NMLs.	



Abbreviations	Expanded Text	
	Works which are defined as annoying under the Interim Construction Noise Guideline (DECC, 2009) including:	
Highly Noise Intensive Works	Use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work	
	Grinding metal, concrete or masonry	
	Rock drilling	
	Line drilling	
	Vibratory rolling	
	Bitumen milling or profiling	
	Jackhammering, rock hammering or rock breaking	
	Impact piling.	
IB	Individual briefing	
ICNG	Interim Construction Noise Guideline (DECC 2009)	
Infrastructure Approval	Approval (SSI 9364) for carrying out of the M12 Project under Section 5.19 of the <i>Environmental Planning and Assessment Act 1979</i> subject to specific CoA as detailed in Schedule 2 of the approval.	
km	Kilometres	
LAeq (15min)	The A-weighted equivalent continuous (energy average) A-weighted sound pressure level of the construction works under consideration over a 15-minute period and excludes other noise sources such as from industry, road, rail and the community	
LA (max)	The A-weighted maximum noise level only from the construction works under consideration, measured using the fast time weighting on a sound level meter	
LGA	Local Government Area	
NCAs	Noise catchment areas	
NML	Noise management level	
Noise affected	The noise affected level represents the point above which there may be some community reaction to noise.	
NPfI	Noise Policy for Industry	
NSW CoA	NSW Conditions of Approval	
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water (formerly NSW DPE which has now been split into NSW DCCEEW and NSW DPHI)	
NVIS	Noise and Vibration Impact Statement	



Abbreviations	Expanded Text
ocs	Overarching Communication Strategy
OEH	Office of Environment and Heritage, now EHG
ООН	Out-of-Hours
OOHW	Out-of-Hours Works – work completed outside of standard construction hours
Planning Secretary	Secretary of the NSW Department of Infrastructure, Planning and Environment, or delegate
PLO	Public Liaison Officer
Primary CoA/REMM	CoA/REMM that are specific to the development of this Plan
Project, the	M12 Motorway Project
R1	Respite Period 1
R2	Respite Period 2
RBL	The Rating Background Level for each period is the medium value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period (day, evening and night)
REMMs	Revised Environmental Management Measures
RNP	NSW Road Noise Policy (DECCW 2011)
Roads and Maritime	Former NSW Roads and Maritime Services (now Transport for New South Wales)
SAP	Sensitive Area Plan
SEAR's	Secretary's Environmental Assessment Requirements
Secondary CoA/REMM	CoA/REMM that are related to, but not specific to, the development of this Plan
SEMP	Site Establishment Management Plan(s)
SEO	Senior Environment Officer
Standard construction hours	Hours during which construction work is permitted by the CoA
SN	Specific notifications
SWL	Sound Power Level
SPL	Sound Pressure Level
TfNSW	Transport for New South Wales



Abbreviations	Expanded Text
VDVs	Vibration dose values
Work	Any physical work to build or facilitate the building of the CSSI, including low impact work, environmental management measures and utility works. However, it does not include activities that inform or enable detailed design of the CSSI and generate noise that is no more than 5 dB(A) above the rating background level at any sensitive receiver.
WSIA	Western Sydney International Airport



1 Introduction

This Out-Of-Hours Work (OOHW) Protocol has been developed to assist with any work associated with the M12 Motorway that will be carried out outside the standard hours of work, as defined with the NSW Conditions of Approval (CoA) E34 and that are not subject to an Environment Protection Licence (EPL). This OOHW Protocol also satisfies NSW CoA E36(c)(ii), where works can be approved outside the standard hours through an approval of an OOHW Protocol.

This OOHW Protocol forms part of the environmental documentation prepared for the M12 Early Works including the Early Works Environmental Management Plans prepared in accordance with NSW CoA A24. This Overarching OOHW Protocol also forms part of the main civil Contractors Construction Environmental Management Plan (CEMP). The protocol will also be used by the main civil Contractors for any works not subject to an EPL, which are expected to be minimal. The use of the Overarching OOHW protocol for any works not subject to an EPL will be included in the Contractors stage-specific Construction Noise and Vibration Management Plan, which forms part of their CEMP. This OOHW Protocol has been prepared in consultation with the Environmental Representative (ER) (Attachment 1).

1.1 NSW Conditions of Approval

The primary NSW CoA relevant to this Plan are listed Table 1-1 below. A cross reference is also included to indicate where the condition is addressed in this document.

Table 1.1 - Out-of-Hours Work Protocol NSW CoA 37

CoA No.	Condition Requirements	Document Reference
E37	An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of Work which is outside the hours defined in Condition E34, and that are not subject to an EPL. 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:	This OOHW Protocol Section 1 Section 1.4 Attachment 1
	 (a) 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 confirm 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 2 Section 4.3 Attachment 3



CoA No.	Condition Requirements	Document Reference
	(b) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria;	Section 2.1 Section 2.2
	(c) 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 E47. 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;	Section 3 Section 5
	(d) 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	Section 2.3
	(e) notification arrangements for affected receivers for all approved out-of-hours Work and notification to the Planning Secretary of approved low risk out-of-hours Work. This condition does not apply to Work where the requirements of Condition E36(a) or (b) are met.	Section 4.3 Section 5

1.2 Justification for OOHW

In accordance with NSW CoA E34, the Contractors will conduct activities within the approved standard construction hours outlined in the NSW CoA E34:

- Monday to Friday: 7:00 am to 6:00 pm
- Saturday: 8:00 am to 6:00 pm (subject to prior approval from TfNSW for M12 West and Central)
- Sundays and public holidays: no work.

In accordance with TfNSW Specification G1 (Job Specific Requirements), any application for to work between 8:00am and 6:00pm on Saturdays (the allowable work hours on Saturdays identified in the Infrastructure Approval for M12 West and Central stages only) must be submitted to the TfNSW no later than 12:00pm on the Thursday immediately prior to the Saturday proposed to undertake work. The application must include the details of the work activities to be undertaken. Approval is at the discretion of TfNSW. Applications for work between 8:00am and 6:00pm on Saturdays will not be required for works that form part of the M12 East package.

In accordance with NSW CoA E35, highly noise intensive activities that result in the exceedance of an applicable noise management level (NML) at the same receiver must only be undertaken

- Monday to Friday: 8:00 am to 6:00 pm
- Saturday: 8:00 am to 1:00 pm



• If continuously, then not exceeding three hours, with a minimum cessation of work of not less than one hour

Certain activities may need to be carried out outside of standard hours. There are two periods of OOHW including:

- 1) OOHW Period 1
 - a. Monday to Friday: 6pm to 10pm
 - b. Saturday: 7am to 8am and 6pm to 10pm; and
 - c. Sunday and Public Holidays: 8am to 6pm.
- 2) OOHW Period 2:
 - a. Monday to Friday: 10pm to 7am
 - b. Saturday: 10pm to 8am; and
 - c. Sunday and Public Holidays: 6pm to 7am the following day (unless that day is Saturday then to 8:00am).

Where requirements of the CoA are satisfied the Contractors may carry out OOHW.

The Contractors will provide justification of the need for OOHW in accordance with the Interim Construction Noise Guideline or where OOHW is required:

- For technical considerations (such as the need to meet particular quality specifications)
- To maintain the safety of road users or site personnel
- Where a road occupancy license will not be provided during standard times
- Where a utility service operator has advised that the works undertaken during standard hours will result in a high risk to the operation or integrity of the network.

Work activities that may require scheduled OOHW include, but are not limited to:

- Traffic management for work required close to live traffic including vegetation clearing and setting up safety barriers
- Traffic Switches or road-tie in work
- Utility outages / cutovers
- Utility and service relocations
- Paving works
- Asphalting
- · Concrete pours
- Ancillary facility operation
- Vegetation clearing and grubbing.

Work activities that may be required or proposed to be undertaken outside of standard working hours will be assessed in accordance with the process outlined in this OOWH Protocol.



1.3 Exclusions

Works outside of the standard construction hours (as identified in Section 1.1) may be undertaken in the following circumstances as permitted by NSW CoA E36:

- Safety and Emergencies, including:
 - For the delivery of materials required by the NSW Police Force or other authority for safety reasons or
 - 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.

Work that causes:

- LAeq(15 min) 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
- LAFmax(15 min) noise levels no more than 15 dB(A) above the rating background level at any residence during the night time period; and
- Continuous or impulsive vibration values, measured at the most affected residence, that are no more than those for human exposure to vibration, specified for residences in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006) and
- Intermittent vibration values, measured at the most affected residence, that are no more than those for human exposure to vibration, specified for residences in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006).
- By approval, including:
 - Where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or
 - Works which are not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by NSW CoA E37; or
 - Where negotiated agreements with directly affected residents and sensitive land uses have been reached.

On becoming aware of the need for emergency works, Contractors will notify TfNSW, ER, the Planning Secretary and the EPA of the need for the emergency works. The Contractors will use best endeavours to notify all affected sensitive receivers of the likely impact and duration of the emergency works.

Emergency work is defined as work that is required to:

- Avoid injury or the loss of life;
- To avoid damage or loss of property; or
- To prevent environmental harm.

Work carried out outside standard construction hours without prior approval or where the definition of emergency work isn't met is considered an environmental incident and non-compliance and will



be managed in accordance with processes set out in the relevant Early Works Environmental Management Plan or CEMP.

OOHW that is approved but not carried out in accordance with the approval or required management measures would also be considered a non-conformance with the OOHW Approval Request Form and managed in accordance with processes outlined in the approved Early Works Environmental Management Plan or CEMP.

1.4 Review, approval and modification of this Protocol

This OOHW Protocol must be approved by the Planning Secretary prior to the commencement of the OOHW.

Amendments to this OOHW Protocol will be sent to the ER for consultation and then forwarded to the Planning Secretary for approval.



2 OOHW noise and vibration assessment

Prior to undertaking any OOHW, the Contractors will undertake a noise and (if applicable) vibration assessment to assess the noise and vibration impacts for any low and high risk activities proposed outside standard hours. The assessment will include details of the work to be undertaken, plant and equipment required, scheduling and duration of the work, predicted impacts on sensitive receivers, their location and proposed mitigation measures.

The inputs into the noise and vibration assessment are to be as accurate as possible and checked by relevant construction personnel. Where uncertainty exists about specific details, a worst-case scenario must be assessed.

Where changes to the scope of the OOHW occur following approval of the OOHW Approval Request Form, the Contractor must follow the change management process outlined in Section 6.5. The proposed OOHW is classified low risk (in accordance with E37(a) if it meets the following criteria:

- Works that generate noise (equal to or less than 15dB(A)) up to and including the "Clearly Audible" OOHW classification as outlined Attachment 2, and meets the following durations (as experienced by the receiver):
 - Three evenings and night periods in a calendar week with only two consecutive evenings and night periods permitted
 - o A maximum of 10 evenings and nights periods in a calendar month.

The effect of the above facilitates two evening and night periods in a row and at least one period off before the third period that week. In accordance with CoA E37(a)(ii)), the Environmental Representative (ER) has the authority to approve low risk OOHW activities.

If the duration limitations outlined above cannot be achieved, the proposed OOHW is classified as high risk. In this instance, the assessment of the proposed OOHW and the OOHW Approval Request Form will be issued to the Planning Secretary for review and approval.

2.1 Noise

The noise assessment is to be prepared by the Contractor in accordance with the CoA and this OOHW Protocol and will determine the extent of noise impact the Works activities will have on sensitive receivers by undertaking a quantitative assessment. The assessment will identify the exceedances of activity scenarios against the NMLs adopted for each Noise Catchment Area (NCA) or other sensitive land uses.

The noise assessment will document predicted noise levels, frequency and duration of OOHW, awakening events/sleep disturbance and determine the appropriate standard and additional mitigation measures. The noise assessment will also consider if feasible and reasonable work practices have been identified to minimise the noise.

Where a noise assessment has been prepared for an approved Early Works Environmental Management Plan or CEMP and considers OOHW for the type of activity to be undertaken, this assessment can be relied upon to fulfil this requirement.



Noise and Vibration Impact Statements (NVIS) will be prepared for any work that may exceed the NMLs and vibration criteria specified in NSW CoA E38 at any residence outside the standard work hours identified in NSW CoA E34, or where receivers will be highly noise affected. The NVIS must include specific mitigation measures identified through consultation with affected sensitive receivers and the mitigation measures must be implemented for the duration of the work. Feedback on mitigation measures will be sought from affected sensitive receivers through notifications or via phone calls. A copy of the NVIS must be provided to the ER prior to the commencement of the associated work. The Planning Secretary may request copies of the NVIS.

2.2 Vibration

An assessment will be required for vibration intensive OOHW within the safe working distances for human comfort for the nominated plant and equipment. Prior to undertaking an assessment, all other feasible and reasonable options to use less vibration intensive equipment will be investigated and exhausted.

2.3 Co-ordination of OOHW with third parties

All OOHW, including works undertaken by a third party, will be co-ordinated with other CSSI, SSI and SSD projects that are being constructed nearby, to implement the appropriate management measures and respite periods as specified in NSW CoA E45.

Works will be scheduled with the aim of minimising concurrent works near sensitive receives in consultation with managers of other nearby projects that are likely to result in a cumulative impact. This will include:

- Coordination between project teams
- Rescheduling of work to provide respite to impacted noise sensitive land user(s) so that respite
 is achieved during OOHW
- Consideration to the provision of alternative respite or mitigation to impacted noise sensitive land users where OOHW respite as per NSW CoA E47 cannot be provided.

Consultation will be undertaken in accordance with the Overarching Communication Strategy (OCS) to ensure works can be coordinated with third parties under NSW CoA E37(d).



3 OOHW noise and vibration management measures

Following the noise and vibration assessment, the Contractors will identify any additional mitigation measures, consistent with the TfNSW Construction Noise and Vibration Guideline (CNVG) (2016), that are proposed to manage OOHW noise and vibration impacts from the Project. The most appropriate reasonable and feasible management measures will be determined in accordance with the ICNG. Additional mitigations measures will be implemented and will relate directly to the risk factor (Attachment 3) of the proposed OOHW.

The Contractors will identify the OOHW period, the predicted airborne LAeq(15mins) noise level at receiver, and dB(A) above the RBL and NML. This will determine the appropriate management measures to mitigate the noise and vibration impacts. Attachment 2 outlines the approach for the application of standard and additional mitigation measures to minimise impacts from OOHW.

Where additional mitigation measures are proposed, the Contractors Public Liaison Officer (PLO) in conjunction with TfNSW will consult with affected sensitive receivers to ensure that their personal circumstances have been taken into account to identify the most appropriate mitigation measures. This must be done prior to seeking approval of an OOHW request form.

The standard mitigation measures include the environmental management measures as described in the relevant approved Early Works Environmental Management Plan or CEMP and cover measures such as:

- Behavioural practices on site
- Equipment selection / Maintaining and monitoring plant
- Use and siting of plant and hoardings
- Site inductions
- Use of non-tonal reversing alarms
- Notification
- Planning noisier work to be carried out earlier in the period.

Details on the additional mitigation measures are provided below. These mitigation measures are aligned with TfNSW CNVG (2016) and are to be applied during OOHW as outlined in Attachment 2.

Stakeholder notifications

Stakeholder notifications will detail work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and a contact telephone number. Notifications will be issued a minimum of seven calendar days prior to the start of works in accordance with the Overarching Communication Strategy for the project.

Specific notifications (SN)

Specific notifications will be letterbox dropped (or equivalent) to identified stakeholders no later than seven calendar days ahead of activities that are likely to exceed the noise objectives. The specific notification provides additional information to more highly affected receivers than covered in general letterbox drops.



Phone calls (PC)

Phone calls detailing relevant information will be made to identified/affected stakeholders within seven calendar days of proposed work. Phone calls provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs. Where the resident cannot be telephoned then an alternative form of engagement will be used.

Individual briefings (IB)

Individual briefings will be used to inform affected sensitive receivers about the impacts of work that is assessed to be moderately intrusive (OOHW period 2) or highly noise intrusive (OOHW period 1 and 2) as outlined in Attachment 2 and the mitigation measures that will be implemented for the work. The Contractor's PLO will identify the relevant sensitive receivers through the noise and vibration impact assessment visit identified stakeholders as part of the planning for the OOHW and prior to submitting an OOHW request for approval. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the project. Where the resident cannot be met with individually then an alternative form of engagement will be used.

Respite offers (RO)

Respite offers will be considered where there are high noise and vibration generating activities near sensitive receivers. The offers will provide residents with respite from an ongoing impact. Respite consultation with affected sensitive receivers must be carried out in accordance with Section 5.1.

Respite periods (R1 and R2)

All work will be included to ensure respite periods. The Contractor will:

- Reschedule any work to provide respite to impacted noise sensitive land user(s) so that the respite is achieved, or
- Where respite cannot be achieved, the provision of alternative respite or mitigation to impacted noise sensitive land user(s) will be considered, and
- Provide documentary evidence to the ER in support of any decision made.

OOHW noise in Period 1 (defined in Attachment 2) will be limited to no more than three consecutive evenings per week except where there is a duration respite. For night work, these periods of work should be separated by not less than one week and no more than six evenings per month.

OOHW night time noise in Period 2 (defined in Attachment 2) will be limited to two consecutive nights except for where there is a Duration Respite. For night work these periods of work will be separated by not less than one week and six nights per month.

Duration respite (DR)

Respite offers and Respite Periods 1 and 2 may be counterproductive in reducing the impact on the community for longer duration projects. In this instance, and where it can be strongly justified, it may be beneficial to increase the work duration, number of evenings or nights worked through duration respite so that the Project can be completed more quickly.



Where the work exceeds the noise and vibration criteria outlined in E36(b) the Contractor's PLO in conjunction with TfNSW will negotiate agreements with the directly affected sensitive receivers as outlined in Section 5.2. If the Contractor and TfNSW cannot reach agreements with 100% of directly affected sensitive receivers, then the work is considered a high risk activity and approval is required from the Planning Secretary to carry out duration respite.

Alternative accommodation (AA) or other agreed mitigation measures

Temporary alternative accommodation or other agreed mitigation measures will be offered / made available to residents affected by out-of-hours work as specified in NSW CoA E46. This will include where the construction noise levels during OOHW Period, ie between:

- 10:00 pm and 7:00 am, Monday to Friday;
- 10:00 pm Saturday and 8:00 am Sunday; and
- 6:00 pm Sunday and public holidays to 7:00 am (the following day unless that day is Saturday then to 8:00 am)

are predicted to exceed the NML by 25 dB(A) or are greater than 75 dBA (LAeq(15 min)), whichever is the lesser and the impact is planned to occur for more than two (2) nights over a seven (7) day rolling period.

The NML must be reduced by 5dB where the noise contains annoying characteristics and may be increased by 10dB if the property has received at-property noise treatment.

The noise and vibration assessment outlined in Section 2.1 would identify receivers that are eligible for alternative accommodation. Initial discussion about offers to affected residents should be made during the planning phase of OOHW and prior to seeking approval for the work.

Verification (V)

Attended measurements will be carried out by an appropriately trained person in the measurement and assessment of noise and vibration. The attended measurements will include evaluation of both work noise and background noise levels compared with the predicted and estimated levels used in the assessment. The attended measurements may include:

- Noise levels for plant and equipment: attended measurements will be undertaken within
 a period of 14 days of equipment arriving on site to confirm that the operating noise levels
 of all plant items comply with the maximum levels in the CNVG (TfNSW 2016). The
 attended measurements are to be repeated on a three-monthly basis to ensure that noise
 from individual plant items are still within the acceptable noise range.
- Noise and vibration verification in the community: attended measurements are to be
 undertaken within a period of 14 days from the commencement of activities. The attended
 measurements will need to be repeated on a three-monthly basis as part of the audit cycle
 to ensure that noise and vibration levels in the adjacent community remain consistent with
 the predicted levels in the noise assessment, approval and/or licence conditions.

The results of the attended noise measurements will be used to update the Early Works Environmental Management Plan or CEMP and other relevant environmental management documents as required.



4 Compliance management

4.1 Roles and responsibilities

Subject to the approval pathway, an OOHW approval request will be developed. The Contractors will be required to complete an OOHW approvals request form (refer to Attachment 3).

The Contractor's PLO in conjunction with TfNSW will be responsible for ensuring that notification and consultation has occurred with community stakeholders, in accordance with the conditions of approval and the Overarching Communication Strategy, on the likely impacts of OOHW activities.

The Construction Contractor ESR (or delegate) will implement and oversee the noise monitoring program for OOHW to assess compliance with the CoA, the EPL and the OOHW Protocol. The Construction Contractor ESR is also responsible for notifying the ER and Planning Secretary of any noise exceedances or complaints during OOHW.

Prior to the start of OOHW, the works supervisor will be responsible for completing a pre-start checklist to ensure compliance with the OOHW Approval Request Form.

4.2 Induction / training

All site personnel (including sub-contractors) will be inducted on the control measures to be implemented to minimise impacts of OOHW on the community and environment and this OOHW Protocol. Training will include inductions, toolbox talks, pre-starts and targeted training as required.

4.3 OOHW process and approval

For proposed OOHW, the following process will be followed:

- 1) The OOHW approval request (Attachment 3) will be prepared by the Contractors and include information on:
 - Activities
 - Required plant and equipment
 - Location
 - Duration
 - Justification for the work
 - Details of the completed quantitative noise assessment (in accordance with Section 2.1) including predicted impacts and appropriate management measures as per Section 3 and Attachment 2 of this protocol
 - Details of consultation with the community regarding respite periods and scheduling as outlined in Section 5 of this protocol



- 2) The Contractor will submit the OOHW request to TfNSW for review. The TfNSW Project Manager and Senior Environment and Sustainability Manager (or delegate) will determine if the justification for the OOHW is satisfactory.
- 3) TfNSW will provide the OOHW request to the ER for review and confirmation of the risk level, in accordance with NSW CoA E37(a) and Section 2 of this protocol.
- 4) The identification of the OOHW as a low or high-risk activity will determine who can then approve the OOHW:
 - Low Risk Activities: approved by the ER. The ER will consider the criteria outlined in Section 2 as well as ongoing and cumulative impacts, construction fatigue and complaints in reviewing the determined risk level. If required, the ER may consult with the Department of Planning, Housing and Infrastructure (DPHI) Representatives at times to discuss the assessed risk level. The ER will have 10 days to review the OOHW approval request. The Planning Secretary will also be notified of all approved low risk OOHW.
 - **High risk activities:** must be approved by the Planning Secretary. The Planning Secretary will have one month to review the OOHW approval request.
- 5) Following approval of each OOHW request, the Contractors in conjunction with TfNSW will undertake community consultation and notification in accordance with Section 5 of this protocol.
- 6) Noise monitoring and reporting will be carried out in accordance with Section 6 of this protocol.



5 Communication and notification

Prior to undertaking approved OOHW, the Contractors in conjunction with TfNSW will consult with the potentially affected sensitive receivers, where applicable. The Contractor's PLO in conjunction with TfNSW will notify the potentially affected receivers of upcoming OOHW 5-10 working days before commencing the work in accordance with the OCS.

Letterbox notification letters will be used to inform directly affected residents and businesses about any changes that may impact on properties, such as access arrangements, construction of temporary work and permanent changes and work outside normal working hours. Notification of OOHW will be delivered to the relevant stakeholders at least seven calendar days prior to work starting. Contractors will provide the notification letters for TfNSW approval at least 15 business days before work commences.

5.1 Respite consultation

To undertake OOHW outside the hours specified under NSW CoA E34, Contractors must identify appropriate respite periods for the OOHW in consultation with the community at each affected location on a regular basis. The Contractors will consult with the community at affected locations, in accordance with the consultation requirements prescribed by NSW CoA E47. The outcomes of the community consultation, the identified respite periods and the scheduling of the likely OOHW will be provided to the EPA, ER and Planning Secretary for information within one week of undertaking the community consultation.

The consultation must include (but not be limited to) providing the community with:

- Progressive schedule for periods no less than three months, of likely OOHW
- Description of the potential work, location and duration of the OOHW
- Noise characteristics and likely noise levels of the work
- Mitigation and management measures which aim to achieve the relevant noise management levels and vibration criteria under NSW CoA E38(a) and (b).

Contractors will provide the TfNSW Project Manager and TfNSW ESM (or delegate) evidence of the consultation undertaken for the OOHW.

5.2 Negotiated agreements

Works outside of standard hours that do not meet the circumstances listed in NSW CoA E36(a),E36(b), E36(c)(i) or E36(c)(ii) may be undertaken if agreement between Contractors and the directly affected noise sensitive receivers has been reached in accordance with NSW CoA E36(c)(iii). The community agreements between TfNSW and the directly affected residents and sensitive land users will be:

- Prepared in writing and a copy of the agreement(s) kept on the premises for the duration of the OOHW
- Made available for the duration of the agreement (personal details of noise sensitive receivers will be omitted).

Where a community agreement has been attained by phone, the following may apply:



- Phone script used to describe the proposed agreement is to be provided to TfNSW with the community agreement for approval
- Phone script to include a description of the proposed works, the likely impacts and benefits for the community and a clear question requesting receiver agreement to the proposal
- Detailed records are to be maintained for the duration of the community agreement
- Any noise sensitive receiver, who requests a copy of the phone agreement will be supplied with one.

It is noted that where negotiated agreements are used to undertake OOHW not subject to an EPL under E36(c)(iii), then agreements must be reached with 100% of the directly affected residents and sensitive land users.

In accordance with NSW CoA E39, noise generating work in the vicinity of potentially affected community, religious, educational institutions, noise and vibration-sensitive businesses, and critical working areas (such as theatres, laboratories and operating theatres), resulting in noise levels above the NMLs will not be scheduled within sensitive periods, unless TfNSW and the potentially affected institution or business have made other arrangements. These arrangements will be implemented at no cost to the affected institution.



6 Monitoring and reporting

6.1 Monitoring for OOHW

The Construction Contractor ESR will ensure the following noise and vibration monitoring is undertaken for all OOHW:

- Attended noise monitoring at representative sensitive receivers
- Attended vibration monitoring at representative sensitive receivers
- Additional noise and vibration monitoring and review if complaints about the activity are received.

All OOHW monitoring will be carried out by an appropriately trained person in the measurement and assessment of construction noise and vibration.

Validation monitoring will be undertaken for any works that are the subject of a community agreement and will be performed by a suitably qualified and experienced person on at least the first two nights where OOHW will be undertaken. If validation monitoring shows that noise levels are higher than those predicted by any noise modelling undertaken as part of the community agreement, work practices will be modified so that measured noise levels do not exceed predicted levels.

6.2 Complaints management

Complaints received as a result of the OOHW will be managed in accordance with the Complaints Management Strategy and OCS.

6.3 Reporting on non-conformances and exceedances

Where monitoring identifies any exceedances of the levels predicted in the OOHW assessments, a review of OOHW activities will be carried out to determine where noise or vibration levels can be further reduced. Where monitored noise or vibration levels are found to exceed the relevant criteria, the exceedance will be managed in accordance with the procedures outlined in the Early Works Environmental Management Plan or CEMP.

Where the processes and systems outlined in this protocol are not followed or where work isn't in accordance with the approved OOHW Approval Request Form, this will be deemed a non-conformance with this protocol. The non-conformance will be managed in accordance with the procedures outlined in the Early Works Environmental Management Plan or CEMP, including reporting via the TfNSW Environmental Event Form.

6.4 Records

The Contractors will maintain accurate records of all OOHW applications and noise and vibration monitoring undertaken during OOHW for the duration of the Project.



6.5 Change Management

Where changes to the scope of the OOHW (including to plant and equipment) occur following approval of the OOHW request, the Environmental Site Representative must complete a consistency review of the noise and vibration assessment to assess the impacts of the changes (see Attachment 4).

The use of recognised plant and equipment noise values (TfNSW Noise Calculator or similar plant noise lists), noise calculation assumptions and established guidance on the effect of barriers to noise must be used appropriately and duly documented in the Noise Assessment Consistency Review (Attachment 4).

Where the impact is the same or less than the impacts predicted in the original noise and vibration assessment, no additional sensitive receivers are impacted, community notifications do not need amending and cumulative impacts have been considered to facilitate the works, then no further approval is required. Where the impact is greater than the impacts predicted in the original noise and vibration assessment, the Contractor must re-submit the OOHW request for approval to TfNSW and the ER. Additional management measures will need to be considered and implemented where relevant. The Contractor Project Manager (or delegate) is responsible for approving commencement of the updated scope of work (see Attachment 3).



Attachment 1 – Consultation with ER



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15 August 2022

Deanne Forrest
Project Director M12
Sydney Infrastructure Development
Infrastructure and Place
Transport for NSW
Level 7 27-31 Argyle Street
Parramatta NSW 2150

Ref: Overarching OOHWP Rev I

Dear Deanne,

RE: ER Consultation for M12 Motorway – Overarching Out of Hours Work Protocol Rev I

Thank you for providing the following document for Environmental Representative (ER) consultation as required by the Condition of Approval E37 of the M12 Motorway approval (SSI 9364):

M12 Motorway – Overarching Out of Hours Work Protocol Rev I

I have reviewed this Out of Hours Work Protocol which was prepared by Transport for NSW. Previous versions of the document for individual packages have been reviewed and updated following comments from the ER.

The most recent revision has included minor updates to provide clearer guidance regarding the distinction between Low-Risk and High-Risk works.

As an approved ER for the M12 Motorway project, I am satisfied my comments have been sufficiently addressed and consider consultation on this Out of Hours Work Protocol to be complete.

Yours sincerely



George Kollias Environmental Representative – M12 Motorway



Attachment 2 – Application of OOHW mitigation measures

Predicted airborne Laeq (15mins) noise level at receiver				Mitigation measures			
OOHW period 1	Perception	dB(A)	dB(A) above	Standard mitigation measures	Additional mitigation	n measures	
		above RBL	NML ¹		Туре	Mitigation level	
Monday – Friday: 6 pm – 10 pm Saturday: 7 am – 8 am and 6 pm – 10pm Sunday and Public Holidays: 8 am – 6 pm	Noticeable	5-10	<5	 Behavioural practices on site Equipment selection / Maintaining and monitoring plant Use and siting of plant and hoardings Site inductions Use of non-tonal reversing alarms Notification Planning noisier work to be carried out earlier in the period 	N/A	NML	
	Clearly Audible	10-20	5-15	Standard measures as above	NotificationRespite period 1Duration respite	NML + 5	
	Moderately intrusive	20-30	15-25	Standard measures as above	NotificationVerificationRespite period 1	NML + 15	



Predicted airborne Laeq (15mins) noise level at receiver				Mitigation measures				
	Highly intrusive	>30	>25 • Standard measures as above		 Duration respite Notification Verification Individual briefing Respite period 1 Duration respite Phone calls Specific notifications 	NML + 25		
OOHW period 2	Perception	dB(A) above RBL	dB(A) above NML ¹	Standard mitigation measures	Additional mitigation	on measures Mitigation level		
Monday– Friday: 10 pm – 7 am Saturday: 10 pm – 8 am Sunday and Public Holidays: 6 pm – 7 am the following day (unless that day is	Noticeable	5-10	<5	 Behavioural practices on site Equipment selection / maintaining and monitoring plant Use and siting of plant and hoardings Site inductions Use of non-tonal reversing alarms Notification Planning noisier work to be carried out earlier in the period 	N/A	NML		
Saturday then to 8:00am)	Clearly Audible	10-20	5-15	Standard measures as above	NotificationVerificationRespite period 2Duration respite	NML + 5		



Predicted airborne Laeq (15mins) noise level at receiver				Mitigation measures				
	Moderately intrusive	20-30	15-25	Standard measures as above	 Notification Verification Individual briefing Respite period 2 Duration respite Phone calls Specific notifications 			
	Highly intrusive	>30	>25	Standard measures as above.	 Notification Verification Individual briefing Respite period 2 Duration respite Phone calls Specific notifications Temporary alternative accommodation 			

¹ If the calculated predicted noise levels are at the top of the range i.e. 15dB(A) for the specific 'perception' then it is considered 'Clearly Audible' for the purposes of interpreting this table.



Attachment 3 – OOHW Approval Request Form

Out of hours Work Approval Request form- M12 Motorway Works							
Application Reference and Revision No:	Notification date:	Approv	val date:	Project:			
A. Contact details	Name	Mobile	number	Email			
Contractor ESR							
Contractor Construction Manager							
Contractor Foreman / Site Supervisor							
Contractor Project Engineer							
B. Details of	Location (Chainage):						
work: Include a map	NCA/s:						
showing location of work extent and nearest	Description of activities to be carried						
sensitive	Typical plant and equipment to be us	ed.					
receivers	Guidance (delete on final document). plant and equipment list will form the of the noise assessment for the work Include reference to "stand-by" equip that may be present on site but would be used in the event of a breakdown. If plant and equipment is changed or substituted following approval of the Approval Request Form the Environm Site Representative must undertake a consistency review as per Attachmen Where noise impacts are predicted to						
	greater than those outlined in the initinoise assessment, appropriateness of environmental management measure to be considered and an updated OC Approval Request Form approval musought.	ial of es are OHW					
	Plant and equipment list checked by	_	Name:				
	construction personnel ordering plant/equipment.		Signature:				
			Date checked:				



Application Reference and	Notification date:	Approval date:		Project:				
Revision No:								
	Tutti and an analysis in the							
	Traffic control measures required:							
	Lighting required:							
	Proposed mitigation measures:							
	Proposed dates:							
	Proposed timings:							
	Justification (Why does work need to o outside of standard construction hours							
C. Risk factor category (low, high) and evidence of risk confirmation from the ER:	Low Comments		High					
D. Details of noise or vibration assessment completed:	Provide details of quantitative assessments as levels, potential noise exceedant sensitive receivers and proposed mana CNVG. Where alternative accommodal include details of and offers made to quantitative accommodal include details of and offers made to quantitative accommodal include details of and offers made to quantitative assessments.	ces agai agemen tion or c	nst relevant NMLs, t measures in acco other agreed mitigat	potentially affected rdance with ICNG and				
	Guidance for assessment (delete on finaccurate as possible and checked by rease scenario assessment where unce	elevant	construction persor	-				
	Guidance for management measures: supervisor to complete a pre-start checapproval.	include	the requirement for					
E. Review/ Endorsements								
TfNSW Environment and	TfNSW notified? Yes / No							
Sustainability Manager (or delegate) and Project Manager notified	Comments:							
Environmental	ER notified? Yes / No							
Representative	Comments:							



Out of hours Wo	Work Approval Request form– M12 Motorway Works							
Application Reference and Revision No:	Notification date:	Appro	val da	ite:	Project:			
Contractor	Community notified? Yes / No				Date:			
Community Relations Manager	Provide details of consultation with Communication Strategy	affected re	eceive	ers, in accordanc	e with Community			
	Have the works been reviewed and	endorsed	?		Yes / No			
	Name:		Sign	nature:	Date:			
	Comments:							
F. Approvals	Low Risk Activities							
(if required)	ER approval required				Yes / No			
	ER approval letter attached? Or Signature obtained:				Yes / No			
	Of dignature obtained.							
	High Risk Activities							
	Planning Secretary approval required? Yes / No							
	Planning Secretary approval letter	attached?		Yes /	No			
Contractor	Are the works approved for comme	1		Yes / No				
Project Manager (or	Name:		Sign	nature:	Date:			
delegate)								
	Comments:							
	Has the scope of work changed? (I change or substitution of plant and		t).	Yes / No				
	Has a consistency review been cor changes and is the impact due to the		the	Yes / No				
Contractor Project	change the same or less than the control predicted impacts?	riginal		If yes, go to signature panel.				
Manager (or delegate).	Has an updated OOHW request be	en submit	ted	If no, answer n Yes / No	ext question			
Complete in the	and approved by the ER?							
event of scope changes (including plant	Is the updated scope of works applicommencement?	oved for		Yes / No				
and equipment	Name:	Signature			Date:			
changes).								
	Comments:							





Attachment 4 – Noise assessment consistency review

Guidance (delete from final version): This consistency review is only to be used where the OOHW approval requires a scope change (including change or substitution in plant or equipment).

Questions	Yes / No
Has the noise assessment been updated to include new or substituted plant and equipment?	Yes / No
Detail changes made to the noise assessment including the changes to plant / equipment and relevant assumptions.	
Is the impact less than or equal to the impact assessed in the approved OOHW Approval Request Form?	Yes / No
•	sion): if you have answered yes to the above questions, the work nd can be carried out without further approval under this
	above questions, the work is not considered consistent and HW approval under this protocol is required.
Strikethrough text below that is	not relevant:
The work is considered to be Form. OR	consistent with the approved OOHW Approval Request
The work is not consistent wire assessment and approval is re	th the approved OOHW Approval Request Form and further equired
Name of Environmental Site Representative:	
Signature:	
Date:	





CoA

CoA	Condition Requirements	Д	Applicability	Document Reference	
No.		M12 West	M12 Central	M12 East	
A5	Where the terms of this approval require a document or monitoring program to be prepared or a review to be undertaken and submitted to the Planning Secretary, and the terms of this approval require the document, monitoring program or review to be prepared/undertaken in consultation with identified parties, evidence of the consultation must be submitted to the Planning Secretary with the relevant document, monitoring program or review. 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; (c) documentation of the follow-up with the identified party where engagement has not occurred to confirm that they do not wish to engage or have not attempted to engage after repeated invitations; (d) outline of the issues raised by the identified party and how they have been addressed; and (e) a description of the outstanding issues raised by the identified party and the reasons why they have not been addressed.	*	*	✓	Section 1.5.1 Appendix A
A15	Construction ancillary facilities (excluding minor construction ancillary facilities established under Condition A20) that are not identified by description and location in the documents listed in Condition A1 may only be established and used in each case if: (a) they are located within or immediately adjacent to the construction boundary; and (b) they are not located next to a sensitive receiver(s) (including where an access road is between the facility and the receiver(s)), unless the sensitive receiver(s) (both the landowner(s) and occupier(s)2) have given written acceptance to the carrying out of the relevant facility in the proposed location; (c) they have no impacts on heritage items (including areas of archaeological sensitivity), threatened species, populations or ecological communities beyond the impacts approved under the terms of this approval; and	*	✓	*	Section 7.2.4

CoA	Condition Requirements	ļ	Applicability	Document Reference	
No.		M12 West	M12 Central	M12 East	
	(d) the establishment and use of the facility can be carried out and managed within the outcomes set out in the terms of this approval, including in relation to environmental, social and economic impacts.				
A16	Before establishment of a construction ancillary facility(ies) (excluding minor construction ancillary facilities established under Condition A20), the Proponent must prepare a Site Establishment Management Plan which outlines the environmental management practices and procedures to be implemented for the establishment of the construction ancillary facility(ies). The Site Establishment Management Plan must be prepared in consultation with the relevant council(s) and relevant State government agencies. The Plan must be endorsed by the ER and then submitted to the Planning Secretary for approval one (1) month before the establishment of the construction ancillary facility(ies). The Site Establishment Management Plan must detail the management of the construction ancillary facility(ies) and include: (a) a description of activities to be undertaken during establishment of the construction ancillary facility(ies) (including scheduling and duration of work to be undertaken at the site); (b) figures illustrating the proposed site layout and the location of the closest sensitive receiver(s); (c) a program for ongoing analysis of the key environmental risks arising from the site establishment activities described in subsection (a) of this condition, including an initial risk assessment undertaken before the commencement of site establishment work; (d) details of how the site establishment activities described in subsection (a) of this condition will be carried out to: (i) meet the performance outcomes stated in the documents listed in Condition A1, and	•	•	*	Section 7.2.4
	(ii) manage the risks identified in the risk analysis undertaken in subsection © of this condition; and				
	(e) a program for monitoring the performance outcomes, including a program for noise monitoring consistent with the requirements of Condition C14 .				
	The Site Establishment Management Plan must be approved before the establishment of a construction ancillary facility(ies) (excluding minor construction ancillary facilities established				

CoA	Condition Requirements	A	Applicability	у	Document Reference
No.		M12 West	M12 Central	M12 East	
	under Condition A20). Nothing in this condition prevents the Proponent from preparing individual Site Establishment Management Plans for each construction ancillary facility. Note: Condition A16 does not apply to minor construction ancillary facilities established under Condition A20.				
A20	Lunch sheds, office sheds, portable toilet facilities, and the like, can be established and used where they have been assessed in the documents listed in Condition A1 or satisfy the following criteria: (a) are located within or adjacent to the construction boundary; and (b) have been assessed by the ER to ha—e - (i) minor amenity impacts to surrounding residences and businesses, after consideration of matters such as compliance with the <i>Interim Construction Noise Guideline</i> (DECC, 2009), traffic and access impacts, dust and odour impacts, and visual (including light spill) impacts, and (ii) minor environmental impact with respect to waste management, soil, water and flooding, and (iii) no impacts on heritage items (including areas of archaeological sensitivity), threatened species, populations or ecological communities beyond the impacts approved under the terms of this approval.	✓	✓	✓	Section 7.2.4
A21	Boundary screening must be erected around all construction ancillary facilities that are adjacent to sensitive receivers for the duration of construction of the CSSI unless otherwise agreed with affected residents, business operators and landowners.	√	√	√	Section 8
B1	A Communication Strategy must be prepared to provide mechanisms to facilitate communication about Work, construction and operation of the CSSI with: (a) the community (including adjoining affected landowners and businesses, and others directly impacted by the CSSI); and (b) the relevant councils and relevant government agencies.	√	✓	✓	Section 9.2

CoA	Condition Requirements	Д	Applicability	y	Document Reference
No.		M12 West	M12 Central	M12 East	
	The Communication Strategy must address who (the Proponent, Independent Appointments and/or construction contractor) will engage with the community, relevant councils and agencies, how they will engage and the timing of engagements.				
B2	 The Communication Strategy must: (a) identify people, organisations, councils and agencies to be consulted during the design and Work phases; (b) identify details of the community demographics; (c) set out procedures and mechanisms for the regular distribution of accessible information, including to Language Other than English and Culturally and Linguistically Diverse and vulnerable communities, about or relevant to the CSSI; (d) detail the measures for advising the community in advance of upcoming Work, including utility works and upcoming out-of-hours work as required by Condition E47; (e) provide for the formation of issue or location-based community forums that focus on key environmental management issues of concern to the relevant community(ies); and (f) set out procedures and mechanics - (i) through which the community can discuss or provide feedback to the Proponent 24 hours a day, seven days per week; (ii) through which the Proponent will respond to enquiries or feedback from the community; and (iii) to resolve any issues and mediate any disputes that may arise in relation to the environmental management and delivery of the CSSI, including disputes regarding rectification or compensation. 				Section 9.2
B6	A Complaints Management System must be prepared and implemented before the commencement of any Work and maintained for the duration of construction and for a minimum for 12 months following completion of construction of the CSSI. The Complaints Management System must require complainants to be advised that: (a) the Complaints Register may be forwarded to Government agencies, including the Department, to allow them to undertake their regulatory duties;	✓	√	*	Section 9.3

CoA	Condition Requirements		Applicability	Document Reference	
No.		M12 West	M12 Central	M12 East	
	 (b) by providing personal information, the complainant authorises the Proponent to provide that information to government agencies; (c) the supply of personal information by the complainant is voluntary; and (d) the complainant has the right to contact government agencies to access personal information held about them and to correct or amend that information (Collection Statement). The Collection Statement must be included on the Proponent's or project website to make prospective complainants aware of their rights under the Privacy and Personal Information Protection Act 1998. For any complaints made in person, the complainant must be made aware of the Collection Statement. 				
В7	The following information must be available to facilitate community enquiries and manage complaints one (1) month before the commencement of Work and for 12 months following the completion of construction: (a) 24- hour telephone number for the registration of complaints and enquiries about the CSSI (b) a postal address to which written complaints and enquires may be sent (c) an email address to which electronic complaints and enquiries may be transmitted; and (d) a mediation system for complaints unable to be resolved. This information must be accessible to all in the community regardless of age, ethnicity, disability or literacy level and must be provided on the website required under Condition B10.	*	√	√	Section 9.3
C2	The CEMP must provide: (h) a list of all the CEMP Sub-plans required in respect of construction, as set out in Condition C4. Where staged construction of the CSSI is proposed, the CEMP must also identify which CEMP Sub-plan applies to each of the proposed stages of construction;	√	*	√	Section 1.4
	(k) for periodic review and update of the CEMP and all associated plans and programs; and	✓	✓	✓	Section 10

CoA	Condition Requirements		Applicability	Document Reference	
No.		M12 West	M12 Central	M12 East	
C5	The CEMP Sub-plans must state how: (a) the environmental performance outcomes identified in the documents listed in Condition A1 will be achieved; (b) the mitigation measures identified in the documents listed in Condition A1 will be implemented; (c) the relevant terms of this approval will be complied with; and (d) issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed through SMART (Specific, Measurable, Achievable, Realistic and Timely) principles.	✓	✓	✓	Section 2.3 Section 6.3 Section 8
C9	Any of the CEMP Sub-plans may be submitted to the Planning Secretary for approval along with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before the commencement of construction.		~	√	Section 1.4.1
C10	Construction must not commence until the CEMP and all CEMP Sub-plans have been approved, unless otherwise agreed by the Planning Secretary. The CEMP and CEMP Sub-plans, as approved by the Planning Secretary, including any minor amendments approved by the ER must be implemented for the duration of construction. Where construction of the CSSI is staged, construction of a stage must not commence until the CEMP and sub-plans for that stage have been endorsed by the ER and approved by the Planning Secretary.	√	>	√	Section 1.4.1
C12			*	✓	Appendix B
C13	Each Construction Monitoring Program must provide: (a) details of baseline data available; (b) details of baseline data to be obtained and when; (c) details of all monitoring of the CSSI to be undertaken; (d) the parameters of the CSSI to be monitored;	√	*	✓	Section 9.5.1 Appendix B

CoA	Condition Requirements	Applicability			Document Reference
No.		M12 West	M12 Central	M12 East	
	 (e) the frequency of monitoring to be undertaken; (f) the location of monitoring; (g) the reporting of monitoring results and analysis of results against the relevant criteria; (h) details of methods that will be used to analyse monitoring data; (i) procedures to identify and implement additional mitigation measures where results of monitoring indicate unsatisfactory CSSI impacts; (j) a consideration of SMART principles; (k) any consultation to be undertaken in relation to the monitoring programs; and (l) any specific requirements as required by Condition C14. 				
C15	The Construction Monitoring Programs 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.		✓	✓	Appendix B
C16	Unless otherwise agreed with the Planning Secretary, construction must not commence until all of the relevant Construction Monitoring Programs have been approved by the Planning Secretary, and all relevant baseline data for the specific construction activity has been collected.		*	√	Section 1.4.1 Appendix B
C17	The Construction Monitoring Programs, as approved by the Planning Secretary, 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, whichever is the greater.	~	*	✓	Appendix B
C18	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, and relevant government agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.	√	√	✓	Section 6.2 of Appendix B
E52	An Operational Noise Review (ONR) must be prepared (based on the detailed design of the CSSI) to confirm noise mitigation measures that would be implemented for the operation of the	√	✓	✓	Section 7.2.6

CoA			Applicability	y	Document Reference
No.		M12 West	M12 Central	M12 East	
	CSSI. The ONR must be prepared in consultation with the Planning Secretary and relevant council(s) and must:				Section 8 Operational Noise
	(a) confirm the appropriate operational noise objectives and levels for existing sensitive receivers;	✓	✓	✓	Review
	(b) confirm the operational noise impacts based on the final design of the CSSI and modelling undertaken under Condition E51, E51, including operational daytime LAeq,15 hour and night-time LAeq, 9-hour traffic noise contours;	√	√	√	
	(c) review the suitability of the operational noise mitigation measures identified in the documents listed in Condition A1 and, where necessary, investigate and identify additional noise and vibration mitigation measures required to achieve the noise criteria outlined in the NSW Road Noise Policy (DECCW, 2011), including the timing of implementation;	√	*	~	
	(d) include a consultation strategy to seek feedback from directly affected landowners on the noise and vibration mitigation measures; and	✓	✓	√	
	(e) procedures for the management of operational noise and vibration complaints.	✓	✓	✓	
	The ONR must be undertaken at the Proponent's expense and be submitted to the Planning Secretary for information prior to implementing at-property noise mitigation, unless otherwise agreed by the Planning Secretary.	✓	√	✓	
	The Proponent must implement the identified noise mitigation measures and make the ONR publicly available following its submission to the Planning Secretary for information.	✓	✓	✓	
	Note: The design of noise barriers and the like must be undertaken in consultation with the community as part of the Place, Design and Landscape Plan required under Condition E69.	✓	✓	✓	
E53	Operational noise mitigation measures as identified in Condition E52 that will not be physically affected by construction and where the noise management level in Condition E38(a) is likely to be exceeded, must be implemented within six (6) months of the commencement of construction in the vicinity of the impacted residence(s) to minimise construction noise impacts, unless	√	✓	✓	Section 7.2.6 Section 8

CoA	Condition Requirements		pplicability	У	Document Reference
No.		M12 West	M12 Central	M12 East	
	otherwise agreed by the Planning Secretary in accordance with Condition E55. The operational noise mitigation measures must be detailed in the Noise and Vibration CEMP Sub-plan required by Condition C4.				Operational Noise Review
E54	If the ONR required by Condition E52 is not prepared within six (6) months of the commencement of construction, the at-property operational noise mitigation measures required by Condition E53 must be consistent with the measures and the properties identified in Appendix G of the M12 Motorway Amendment Report (October, 2020).			>	Section 7.2.6 Section 8 Operational Noise Review
E55	All requests to the Planning Secretary under Condition E53 must be accompanied by a report justifying why operational noise mitigation measures will not be implemented within six (6) months, along with details of the temporary measures that the Proponent would implement to reduce construction noise impacts, until such time that the operational noise mitigation measures are implemented. The report must be submitted to the Planning Secretary before the commencement of construction which would affect identified residences. All temporary measures must be implemented within six (6) months of the commencement of construction in the vicinity of the impacted residences.		✓	~	Section 7.2.6 Section 8 Operational Noise Review
E81			*	✓	Section 8
E82	Construction and operation of the CSSI must not destroy, modify or otherwise cause direct or indirect damage to the Upper Canal System, including the Cecil Hills Tunnel, and Tunnel Shafts 3 and 4.	√	√	√	Section 8

REMMs

ID	Measure/Requirement	Timing	Applicability			Document
			M12 West	M12 Central	M12 East	Reference
NV02	Measures to minimise and manage construction fatigue are to be investigated through the planning of construction staging.	Detailed design, prior to construction and during construction	√	~	✓	Section 8
NV03	Detailed noise assessments will be carried out for ancillary facilities with the potential to involve high noise generating activities (including batching plant operations). The assessments will consider the proposed site layouts and noise generating activities that will occur at the facilities and assess predicted noise levels against the relevant noise management criteria. The assessments will also consider the requirement for appropriate noise mitigation within ancillary facilities and adjacent to construction works, depending on the predicted noise levels. Any mitigation measures required will be implemented before the start of activities that generate noise and vibration impacts.	Prior to construction	√	√	✓	Section 8
NV04	Monitoring will be carried out at the start of high noise and vibration activities to confirm that actual noise and vibration levels are consistent with the noise and vibration impact predictions. Where mitigation measures were included, measurements will be carried out to confirm the effectiveness. Where the monitoring identifies higher levels of noise and vibration compared to predicted levels, or where mitigation is shown to be ineffective against measured noise and vibration levels, additional mitigation measures will be identified and implemented to appropriately manage impacts where feasible and reasonable.	Construction	✓	√	✓	Section 8 Appendix B
NV05	Where reasonable and feasible, receivers identified as requiring at-property treatment for operational noise mitigation will be identified and offered treatment before construction activities begin that are likely to impact them.	Prior to construction	✓	√	✓	Section 8 Appendix C

ID	Measure/Requirement	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	Reference
NV06	Activities that generate vibration will be managed to avoid impacts on structures and sensitive receivers. This includes implementing appropriate safe working distances where practicable.	Prior to and during construction	✓	√	✓	Section 8
NV07	The use of alternatives to vibration generating equipment will be considered where vibration impacts are predicted.	During construction	√	√	✓	Section 8
NV08	Where works are within the minimum working distances and considered likely to exceed the cosmetic damage objectives (as shown in Figure 7-3 of Appendix G of the amendment report), construction works will not proceed unless:	During construction	✓	1	✓	Section 8 Appendix B
	A different construction method with lower source vibration levels is used, where feasible					
	Attended vibration measurements are carried out at the start of the works to determine the risk of exceeding the vibration objectives.					
NV09	Building Condition Surveys will be offered in writing to property owners before construction where there is a potential for construction activities to cause structural or cosmetic damage.	Prior to construction	√	√	✓	Section 8 Appendix C
	A comprehensive report will be prepared by a suitably qualified professional before the relevant works begin and will comprise a written and photographic condition.					
NV10	Surveys will be carried out to confirm the existing condition of the WaterNSW Upper Canal System and Jemena high pressure gas pipelines to determine appropriate vibration criteria.	Detailed design and during construction	√	✓	√	Section 8 Appendix B
	This will also include consideration of distances from the vibration intensive activity (piling, rock-breaking and vibratory rolling), as well as ground conditions.					

ID	Measure/Requirement	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	Reference
	A vibration criterion of a peak particle velocity (PPV) will be determined in consultation with the relevant utility/service providers, including WaterNSW. In-situ monitoring will be carried out to confirm the vibration levels and assess the impact of vibration. Where the monitoring identifies exceedances in the relevant criteria, or where impacts are identified, additional mitigation measures will be identified and implemented to appropriately manage impacts.					
NV11	The following structures have the potential to be within the safe working distances for sensitive structures (Group 3 from DIN 4150): Item 1: McGarvie Smith Farm Item 2: Fleurs Radio Telescope Site Item 4: Upper Canal System Item 6: McMaster Field Station Item 7: Fleurs Aerodrome. A detailed survey will be completed to determine the potential for vibration impacts and to define appropriate criteria for each heritage item. Vibration monitoring will be carried out when vibration intensive tasks are occurring within the minimum working distances to heritage structures. Where the monitoring identifies exceedances in the relevant criteria, or where impacts are identified, additional mitigation measures will be identified and implemented to appropriately manage impacts.	Prior to and during construction	✓	*	•	Section 8 Appendix B

ID	Measure/Requirement	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	Reference
NV12	Construction vehicle movements (both on and offsite) will be managed to minimise noise impacts. Where feasible, this will include (but not be limited to): • Establishment and use of internal haul routes, or existing major roads where this is not feasible • Restriction of heavy vehicle movements to standard construction hours • Locating traffic marshalling areas away from residences to minimise noise impacts from idling vehicles • Instructing workers on the operation of heavy vehicles entering and exiting the site to minimise noise.	During construction	✓	~	✓	Section 8
NV13	The likelihood of cumulative construction noise impacts will be considered during detailed design when detailed construction schedules of other projects are available. Construction works will be scheduled with the aim of minimising concurrent works near sensitive receivers where possible in consultation with managers of other nearby projects that are likely to result in a cumulative impact. 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.	Prior to and during construction	✓	~	✓	Section 8
CU01	Regular consultation will be carried out with nearby/adjoining projects and key stakeholders during construction to review potential cumulative impacts and construction methodologies (including traffic impacts and noise management), as far as practicable to minimise cumulative impacts.	Prior to and during construction	✓	√	√	Section 6.3 OCS

Appendix E – ARNTG Appendix B – Construction materials

Appendix B - Deemed to comply mitigation packages (Based on Rw+Ctr)

Construction			Treatment Package Type		
1	1	2	3	4	5
Exceedance, dBA	1-5	6-8	9-11	12-14	>14
All	Optional ceiling fans¹ Mechanical ventilation (MV)² New acoustic seals for windows Seal around window architraves / door jambs Seal all vents and openings	As per Category 1 treatments External solid core door (40mm) with per	rimeter acoustic seals, drop seals and threshold :	seals	
Brick veneer or double brick Window area less than or equal to 20% floor area		For 6 dBA exceedance: 6.38mm laminate and roof insulation (R4.0 215mm thick) or 6.5mm lam with acoustic interlayer For 7 dBA exceedance: 8.5mm lam with acoustic interlayer or 10.38mm lam For 8 dBA exceedance: 8.5mm lam with acoustic interlayer or 10.5mm lam with acoustic interlayer or 10.5mm lam with acoustic interlayer or 10mm acrylic panel with nominally 100mm gap or >4mm secondary window with 100mm gap or equivalent	Roof insulation (R4.0 215mm thick) for 9 dBA exceedance: 8.5mm lam with acoustic interlayer or 10.38mm lam Otherwise: 10.5mm lam with acoustic interlayer or 10mm acrylic panel with nominally 100mm agp or >4mm secondary window with 100mm gap or equivalent	>4mm secondary window with 100mm gap, or equivalent Roof insulation (R4.0 215mm thick)	>- Semm secondary window with nominally 100mm gap, or equivalent Roof insulation (R4.0 215mm thick)
Brick veneer or double brick Sliding door area less than or equal to 50% wall area	6.38mm lam, or equivalent	6.5mm lam with acoustic interlayer, or equivalent Roof insulation (R4.0 215mm thick) Or 8.5mm lam with acoustic interlayer, or equivalent	8.5mm lam with acoustic interlayer or >4mm secondary window with nominally 100mm gap, or equivalent Roof insulation (R4.0 215mm thick)	>6mm secondary window with nominally 100mm gap, or equivalent Roof insulation (R4.0 215mm thick)	Semm secondary window with nominally 100mm gap, or equivalent Roof insulation (R4.0.215mm thick)
Lightweight Window area less than or equal to 20% floor area	Seal subfloor Roof insulation (R4.0 215mm thick)	As per Category 1 treatments For 8 dBA exceedance: 10mm argin(panel with nominally 100mm gap, or equivalent Re-sheet wall lining (1x 6mm fibre cement sheeting with nominal board weight of 11 kg/m² and 1 x 13mm plasterboard with nominal board weight of 10.5 kg/m² to finish, or equivalent) Wall insulation (R2.7 90mm thick) Otherwise: 10mm acrylic panel with 100mm gap, or equivalent Additional wall lining (1 x 13mm plasterboard with nominal board weight of 10.5 kg/m² to finish, or equivalent)	As per Category 1 treatments Tomm acrylic panel with nominally Gomm gap, or equivalent Re-sheet wall lining (1x 6mm fibre cement sheeting with nominal board weight of 11 kg/m² and 1 x 13mm plasterboard with nominal board weight of 10.5 kg/m² to finish, or equivalent) Wall insulation (R2.7 90mm thick) Resilient mount to isolate wall lining and stud	As per Category 1 treatments Amm secondary window with nominally 100mm gap, or equivalent Re-sheet wall lining (1x 6mm fibre cement sheeting with nominal board weight of 11 kg/m² and 1 x 13mm plasterboard with nominal board weight of 10.5 kg/m² to finish, or equivalent) Wall insulation (R2.7 90mm thick) Resilient mount to isolate wall lining and stud	As per Category 1 treatments Semm secondary window with nominally 100mm gap, or equivalent Re-sheet wall lining (1x 6mm fibre cement sheeting with nominal board weight of 11 kg/m² and 1 x 13mm plasterboard with nominal board weight of 10.5 kg/m² to finish, or equivalent) Wall insulation (R2.7 90mm thick) Resilient mount to isolate wall lining and stud

Note 1: Ceiling fans should have Direct Current (DC) electric motors to minimise noise.

Note 2: Mechanical ventilation (MV) should be installed so that fresh air is ducted from an unaffected building facade. Mechanical fan noise should meet the recommended noise levels in AS2107.

alignment (T	Appendix F – M7-M12 Interchange Project - Noise Catchment Area alignment (TN188-18F01 NCA Boundary Alignment, dated 31/07/2023, Revision 3)				



31 July 2023

TN188-18F01 NCA Boundary Alignment (r3)

John Holland Mark Turner

M7-M12 Interchange Project - Noise Catchment Area alignment

1 Introduction

The M7-M12 Interchange Project (the Project) will include the approved M7 Motorway Mod 6 Widening project (SSI-663, modification approved 17 February 2023) (M7 Widening) and the eastern section of the approved M12 Motorway project (SSI-9364, approved 23 April 2021) (M12).

The environmental impact assessments for each project define Noise Catchment Areas (NCAs) to group noise-sensitive receivers with a similar ambient noise environment. NCAs allow for the calculation of Noise Management Levels (NMLs) by associating measured background noise levels from unattended noise logging (typically at one location per NCA) to other nearby residences.

NCA boundaries are defined in the following documents:

- M7 Widening: Appendix A of the project's Noise and Vibration Technical Report, included as Appendix E of the project's Environmental Impact Statement (EIS).
- M12: Section 7.7.5 of the project's EIS.

As each EIS was undertaken at separate times, there are some inconsistencies between the NCAs for the M7 Widening and M12 projects (Figure 1.1). To allow for consistent management of potential noise impacts from the Project, realigned NCA boundaries with reference to the most appropriate NCAs from the projects are proposed.





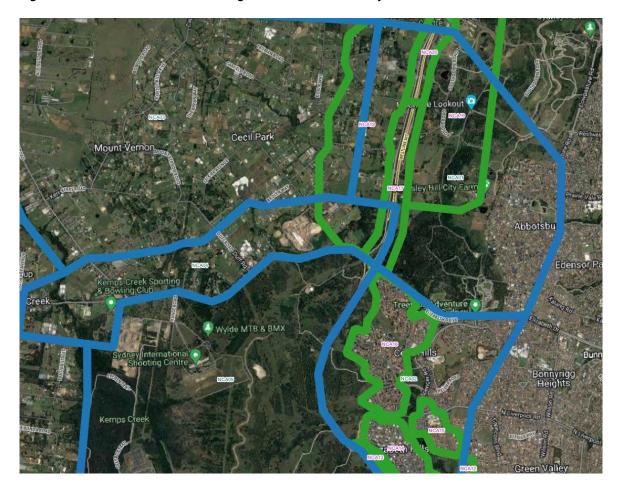


Figure 1.1: EIS M12 (blue) and EIS M7 (green) NCA inconsistency

2 Proposed NCA realignment

2.1 Methodology

Selection and adjustment of NCA boundaries would be undertaken using the following procedure.

- 1. Where NCAs are defined for the M7 Widening, adopt the NCA and associated noise logging results. With reference to the M12 NCAs, where an overlap occurs between the M12 and M7 NCAs, the former would be adjusted to align with the latter.
- 2. Adjust the NCA boundaries to align with logical and reasonable features (e.g. along road), where required.
- 3. Subdivide NCAs near key areas of the Project, such as the M7/M12 interchange, to follow logical boundaries and consider representative background noise levels for the potentially most noise affected receivers. New NCAs may require additional noise monitoring to establish existing background and ambient noise levels.

The above process is proposed for the following reasons:

 Noise logging conducted for the M7 Widening is more recent than the measurements for the M12 (2021 compared to 2017), and as a result is more representative of the ambient noise environment before construction of the Project.

- M12 noise loggers were positioned further away from the potentially most noise-affected residences from the M12 East works (i.e. M12/M7 interchange).
- EIS M7 and M12 NCAs had some boundaries splitting noise sensitive receivers or adjacent properties. This may cause issues when managing noise impacts during the delivery phase due the community expectation and perception. An example of one NCA boundary adjustment is shown in Figure 2.1.
- NCAs near the Elizabeth Drive and M7 intersection, such as NCA16 (from the M7 Widening), would benefit from additional noise monitoring that better reflects the potentially most affected receivers in the area. Adopting additional noise monitoring is consistent with the recommendations of both projects' EIS documents.



Figure 2.1: Adjusted NCA boundary example

2.2 Impact of COVID-19 restrictions

The COVID-19 pandemic resulted in various restrictions which, in turn, led to reduced road traffic volumes. As the background and ambient noise levels in areas around the Project tend to be controlled or significantly affected by road traffic noise, a reduction in road traffic volumes is expected to lead to lower background and ambient noise levels.

To determine whether noise monitoring for the M7 Widening project may be affected by COVID-19, road traffic data was reviewed from the traffic counting station on Elizabeth Drive, as shown in the Transport for NSW Traffic Volume Viewer (station ID 64022). This station is located on Elizabeth Drive between the M7 and Cowpasture Road and has been selected as representative of road traffic in the area due to its proximity to the M7 motorway, as well as its adjacency to potentially affected receivers near the future M7/M12 interchange. It is noted that the M7 motorway would be a significant contributor to background and ambient noise in the area, however, average daily traffic volumes could not be obtained for this motorway.

According to both the M12 and M7 Widening EISs, background and ambient noise in the areas near the future M7/M12 interchange are dominated by road traffic noise. Since the road traffic during February 2021 (when the M7 Widening EIS noise monitoring was undertaken) is generally consistent with prepandemic traffic flows, it is likely that background and ambient noise measured during this period would be representative of the noise environment unaffected by COVID-19 restrictions.

Figure 2.1 summarises a selection of monthly average daily traffic values at the traffic counting station.

Table 2.1: N	Monthly average da	ly traffic volumes, Elizabe	eth Drive (station ID 64022)

Month and year	Monthly average daily traffic	Comments
September 2017	29879	EIS M12 noise monitoring (July 2017). Please note that there is no available data for July 2017.
		Pre-pandemic.
October 2018	29697	Pre-pandemic.
February 2019	30450	Pre-pandemic.
November 2020	30437	During pandemic. No lockdown or notable movement restrictions.
February 2021	31203	EIS M7 noise monitoring
		During pandemic. No lockdown or notable movement restrictions.
July 2021	17516	During pandemic. Lockdown.

2.3 Changes to study area and applicable NMLs

The process in Section 2.1 is intended to remove ambiguity regarding the assignment of a residential receiver to an NCA. If an NCA boundary is found to cross a residential property, then the boundary would be adjusted to include the receiver and realign the boundary with a logical boundary. This process would increase the overall number of receivers considered in noise impact assessments for the Project.

Adjustments to NCA boundaries are also intended to associate residences with the most relevant noise monitoring data and would not drastically depart from the boundaries shown in the relevant EIS. It is acknowledged that some residences on or near the adjusted NCA boundaries would be assigned new NMLs. However, as noted in Section 1, this reassignment is necessary to ensure a consistent approach to managing potential noise impacts is possible.

The applicable NMLs for non-residential receivers would not change, regardless of the NCA boundaries, as the NMLs for non-residential receivers are a fixed value and independent of the background noise level.

3 Conclusion

While there are some inconsistencies between NCAs for the M7 Widening and M12 projects, reasonable and logical adjustments can be adopted for the Project. The proposed NCA boundaries for the Project would ensure a consistent approach to managing construction noise emissions for nearby noise-sensitive receivers.

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
10.05.2023	Issue	0	1	A. Morris	M. Tabacchi	M. Tabacchi
16.05.2023	Add traffic volumes and comment on NMLs	-	2	A. Morris	M. Tabacchi	M. Tabacchi
31.07.2023	Update NCAs extent following comments from DPE	-	3	M. Tabacchi		

File Path: R:\AssocSydProjects\TN151-TN200\TN188 mt M7M12 integration\1 Docs\03 NCA Boundaries\TN188-18F01 NCA Boundary Alignment (r3).docx

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APPENDIX A NCA boundary comparison

