Appendix B2

Construction Noise and Vibration Management Sub-plan

M12 Motorway – Central

January 2025

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Document control

File Name	Construction Noise and Vibration MP
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Approval and authorisation

Plan reviewed by:	Plan reviewed by:
[redacted] Seymour Whyte Environmental Site Representative	[redacted] Seymour Whyte Project Director
18/01/2025	18/01/2025
	

Revision history

Revision	Date	Description
A	18/02/2022	First draft for TfNSW review
B	29/04/2022	Updated in response to TfNSW review
C	27/06/2022	Updated in response to TfNSW review
D	25/07/2022	Updated in response to TfNSW and ER review
E	26/05/2023	Updated to reflect changes in accordance with RFI 383
F	18/07/2023	Updated in response to OCEMP update
G	18/01/2025	Updated in response to OCEMP

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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
AR	Amendment Report
Approved standard hours	Hours during which construction work is permitted by the NSW CoA
ARNTG	At-Receiver Noise Treatment Guideline (Roads and Maritime 2018)
ARSR	Amendment Report Submissions Report
Attenuation	The reduction in the level of sound or vibration
AVTG	Assessing Vibration – a technical guideline (DEC 2006)
CA	Consistency Assessment
CCHMP	Construction Cultural Heritage Management Plan
CEMP	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)
CoA	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 OCEMP, 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 of the Infrastructure Approval 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 (now Department of Climate Change, Energy, Environment and Water DCCEEW)
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 (now Environment and Heritage Group (EHG) (a part of NSW DPE)
DECC	Commonwealth Department of Environment and Climate Change (now DCCEEW)
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)
DPIE	Former Department of Planning, Industry and Environment (now Department of Planning and Environment)
DR	Duration Respites
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

Abbreviations	Expanded Text
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) • 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.
TEnvironmental 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.

Abbreviations	Expanded Text
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 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	Environmental Site Representative (Seymour Whyte)
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).

Abbreviations	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.
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 *Environmental Planning and Assessment Act 1979* 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
NVIS	Noise and Vibration Impact Statement
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
OCEMP	Overarching Construction Environmental Management Plan

Abbreviations	Expanded Text
OCNVMP	Overarching Construction Noise and Vibration Management Sub-plan
OCS	Overarching Communication Strategy
OEH	Office of Environment and Heritage, now EHG
ONR	Operational Noise Review
OOHW	Out-of-Hours Works – work completed outside of approved standard hours
Planning Secretary	Secretary of the NSW Department of Infrastructure, Planning and Environment, or delegate
Primary CoA/REMM	CoA/REMM that are specific to the development of this Plan
Project, the	The CSSI as approved by the Minister for Planning and Public Spaces on the 23 April 2021 (SSI 9364)
QA	Quality Assurance
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
Standard construction hours	Hours during which construction work is permitted by TfNSW QA specification G1
SN	Specific notifications
SWL	Sound Power Level
SPL	Sound Pressure Level
TfNSW	Transport for New South Wales

Abbreviations	Expanded Text
TGS	Traffic Guidance Scheme
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
WSP	Western Sydney Parklands

1 Introduction

1.1 Context

This Construction Noise and Vibration Management Sub-plan (CNVMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the M12 Motorway – Central package.

This CNVMP has been prepared under the Overarching Construction Environmental Management Plan (OCEMP) and relevant sub-plans developed for M12 Motorway (the Project), to address the requirements of the Minister's Conditions of Approval (CoA), Revised Environmental Management Measures (REMMs) listed in the Environmental Impact Statement (EIS), Submissions Report, Amendment Report, and Amendment Report Submissions Report (ARSR), ARSR amendment report, all applicable legislation, and Transport for New South Wales (TfNSW) specifications.

1.2 Background

1.2.1 M12 Motorway (the Project)

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.

Key features of the Project include:

- An east-west 16 km motorway between the M7 Motorway, Cecil Hills and The Northern Road, Luddenham
- A motorway built for four lanes (with provision for up to six lanes) with a median to separate opposing traffic flows
- A direct connection to Western Sydney International Airport
- A new connection to The Northern Road with traffic lights
- A motorway-to-motorway interchange at the M7 Motorway
- Provision for a future interchange connecting Mamre Road and Devonshire Road at the M12 Motorway.

A detailed Project description is provided in Section 2.1 of the CEMP.

1.2.2 Statutory Context

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.

The Project was assessed as part of an EIS, Submission Report, Amendment Report, ARSR and ARSR amendment report which are herein referred to as the Environmental Assessment Documentation. REMMs are nominated in these assessments to manage the identified impacts.

Approval for the Project under the EP&A Act was granted by the Minister for Planning on 23 April 2021 (CSSI 9364). Approval for the Project under the EPBC Act was granted by the Australian Minister for the Environment on 3 June 2021 (EPBC 2018/8286).

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 Sitesd 48, 50 and 51 Boundary Changes 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.

1.2.3 M12 Motorway Delivery Strategy

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

- **M12 West (construct only contract)** – between The Northern Road, Luddenham and about 250 metres east of Badgerys Creek
- **M12 Central (construct only contract)** (the subject of this Plan) – between about 500 metres west of South 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.

Each package of work is to be delivered under separate contracts on behalf of the proponent TfNSW. While the packages will commence at different times there will be periods during which the packages works will overlap. Co-ordination between the contractors will be required to manage cumulative impacts, particularly for noise and vibration.

1.3 M12 Central

Seymour Whyte has been engaged to deliver the M12 Central package. Construction of the M12 Central package involves building 7.5 km of motorway from west of Badgerys Creek to the Water Tower Access Road within Western Sydney Parklands.

The M12 Central package will provide a dual carriageway with a wide median to allow for future widening to six lanes. Safety barriers will be provided along the length of the package. Emergency stopping bays and emergency crossovers will also be provided at regular intervals. A shared user path with lighting will provide an active transport link along the motorway and eastward to the M7.

The M12 Central package includes the following bridges:

- Twin bridges over South Creek
- A bridge for Clifton Avenue over the M12 Motorway
- Twin bridges over Kemps Creek
- Twin bridges over Elizabeth Drive near Mamre Road
- Twin Bridges over Range Road
- A bridge for the Water Tower Access Road over the M12 Motorway
- A private property access bridge in University of Sydney land.

Retaining walls will be provided around Range Road to help limit Project impacts on Range Road. Adjustments will be made to local roads including Clifton Avenue and Salisbury Road.

The M12 Central package also requires relocation of utility services including electricity, water, gas and telecommunications. Urban design features of this package include Aboriginal artwork on bridges, rest areas on shared user paths, interpretive signage and landscape planting.

A detailed description of the M12 Central package is provided in Section 2.3 of the CEMP.

1.4 Scope of the Plan

The scope of this CNVMP is to describe how the potential noise and vibration impacts will be managed during construction of the M12 Central package. This Plan has been prepared under and consistent with the OCEMP, and in particular the Overarching Construction Noise and Vibration Management Sub-Plan (OCNVMP) considering relevant sensitive receivers and construction activities. In the preparation and ongoing implementation of this Plan, SMART (Specific, Measurable, Achievable, Realistic and Timely) principles are to be considered and applied.

This Plan is applicable to all activities during construction of the M12 Central package, including all areas where physical works will occur or areas that may be otherwise impacted by the construction works, and under the control of Seymour Whyte. All Seymour Whyte staff and sub-contractors are required to operate fully under the requirements of this Plan and related environmental management plans, over the full duration of the construction program.

A copy of this CNVMP will be kept on the premises for the duration of construction.

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.

1.5 Environmental Management Systems overview

The Environmental Management System (EMS) for the M12 Central package is described in Section 3 of the CEMP. The EMS is consistent with the overarching EMS described in Section 3 of the OCEMP.

To achieve the intended environmental performance outcomes, Seymour Whyte have established, implemented, maintained and continually improved an EMS in accordance with the requirements of ISO14001:2015. The Seymour Whyte EMS will be adopted as the guiding environmental management framework for the M12 Central package.

The EMS consists of governance documentation, incorporating environmental management plans, policies, procedures and tools including:

- **M12 Central Environment and Sustainability Policy**. Outlines the commitments and intentions established by Seymour Whyte to ensure environmental performance and sustainability objectives and targets are achieved (Appendix A3 of the CEMP)
- **CEMP**. Details the processes and procedures to be implemented during the M12 Central package to comply with applicable CoA, REMMs, Environment Protection Licence (EPL), legislative obligations and contractual requirements. The relevant compliance obligations are detailed in Appendix A1, with a cross reference to where they are met in this Plan
- **Environmental Management Sub-plans**. These documents describe procedures and controls for specific environmental aspects requiring more rigorous management strategies

- **Monitoring Programs**. Details the monitoring regime to be implemented during construction to compare the actual performance of construction against the objectives outlined in the relevant Plan, including setting specific triggers and associated responses
- **Environmental Work Method Statements (EWMS)**. Management measures identified in this Plan 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. Construction personnel undertaking a task governed by an EWMS must undertake the activity in accordance with the mitigation and management measures identified in the EWMS. See Section 3.3.3 of the CEMP for details of the EWMS preparation and approval requirements
- **Sensitive Area Plans (SAPs)**. A series of maps providing key features of the alignment and relevant environmental constraints. Features include waterways, heritage, biodiversity contamination and sensitive receivers amongst other site relevant features
- **Out of Hours Works (OOHW) Procedure**. Outlines a process for the consideration, management and approval of works which are outside the permitted standard construction hours defined in TfNSW QA specification G1
- **Noise and Vibration Impact Statements**. Site specific assessments which utilise information to predict noise and vibration impacts of construction activities used to determine suitable mitigation measures
- Procedures, strategies and protocols. Detailed procedures for inclusion in work packs.

1.5.1 CNVMP preparation, endorsement and approval

The OCNVMP 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). The OCNVMP includes the overarching Construction Noise and Vibration Monitoring Program prepared to satisfy the requirements of NSW CoA C11(a) and NSW CoA C14. The OCNVMP and overarching Construction Noise and Vibration Monitoring Program have been subsequently approved by the Planning Secretary. This stage-specific CNVMP for the M12 Central package has been developed under and consistent with the approved OCNVMP and the overarching Construction Noise and Vibration Monitoring Program.

This CNVMP and Construction Noise and Vibration Monitoring Program (Appendix B) will be reviewed by the TfNSW Environment and Sustainability Manager (ESM) (or delegate) and the independent Environmental Representative (ER) to confirm they are consistent with, and incorporate, all relevant elements of the approved OCEMP, prior to submission to the Planning Secretary for information. Construction of the M12 Central package will not commence until the CNVMP and the Construction Noise and Vibration Monitoring Program are endorsed by the ER and provided to the Planning Secretary for information.

1.5.2 Interactions with other management plans

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

- Site Establishment Management Plan (SEMP), which identifies adjacent residential and other sensitive receivers, Noise Catchment Areas and will be progressively updated to incorporate appropriate management measures identified in Noise and Vibration Impact Statements
- M12 Central Community and Stakeholder Engagement Plan (CSEP) which has been developed under the Overarching Communication Strategy (OCS), which details

procedures and processes for community notification, consultation and complaints management for the M12 Central package

- Construction Cultural Heritage Management Plan (CCHMP) provides details of heritage structures and items in the areas surrounding the construction footprint, which are to be protected from vibration generated during the M12 Central package
- Safety Management Plan provides the framework for managing safety including details of procedures and protocols to manage potential noise and vibration impacts to workers.
- Quality Plan describes 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 CEMP.

1.6 Consultation

The OCNVMP and overarching Construction Noise and Vibration Monitoring Program were prepared in consultation with WaterNSW, Sydney Water, pipeline operators (such as Jemena), and relevant Councils including Penrith City Council, Liverpool City Council and Fairfield City Council. Key matters raised by stakeholders and how they have been addressed are outlined in the OCNVMP including consultation evidence in accordance with NSW CoA C4 and A5. This stage-specific CNVMP has been prepared under and consistent with the OCNVMP and therefore no further consultation is required as part of the preparation of this Plan.

Ongoing consultation between TfNSW, Seymour Whyte, neighbouring Project packages, other construction projects, utility providers, stakeholders, the community and relevant agencies regarding the management of impacts from noise and vibration will be undertaken during the construction of the M12 Central package as required. The process for the consultation will be consistent with the OCS and as described in the CSEP.

2 Purpose and objectives

2.1 Purpose

The purpose of this CNVMP is to describe how Seymour Whyte will manage potential noise and vibration impacts during construction of the M12 Central package.

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
- Infrastructure Approval CoA (SSI 9364)
- TfNSW Quality Assurance (QA) Specifications
- Environment Protection Licence
- 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 for the M12 Central package include:

- Full compliance with the relevant legislative requirements, CoA and environmental management measures
- Meet Environment Protection Licence noise and vibration obligations
- Notify affected sensitive receivers of upcoming works and any out-of-hours works
- Implementation of feasible and reasonable noise mitigation measures, in accordance with the Construction Noise and Vibration Guideline (Roads and Maritime, 2016) (CNVG), and 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, in accordance with the CNVG, and with the aim of achieving the vibration criteria established using the *Assessing vibration: a technical guidelines* (DEC, 2006) (for human exposure)
- Maintain all plant and equipment in accordance with manufacturer's requirements
- Minimising impacts on, and complaints from, the community and stakeholders.
- Manage complaints from the community and stakeholders in accordance with the complaints management process detailed in Section 5.5.3 of the CEMP.

3 Environmental requirements

In accordance with NSW CoA A7, references in the terms of this Plan to any guideline, protocol, Australian Standard or policy are to such guidelines, protocols, Standards or policies in the form they are in at the date of the Infrastructure Approval (CSSI 9364).

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 CEMP.

3.1.2 Guidelines

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

- Construction noise
  - TfNSW QA Specification G36 – Environmental Protection (Management System)
  - *Interim Construction Noise Guideline* (ICNG), Department of Environment and Climate Change 2009
  - *Construction Noise and Vibration Guidelines* (Roads and Maritime, 2016)
  - *Draft Construction Noise and Vibration Guidelines* (Roads and Maritime, 2019)
  - *Road Noise Policy*, Department of Environment, Climate Change and Water 2011.
- Construction vibration
  - TfNSW QA 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
- PS300 – Environmental Design and Compliance, specifically:
  - M12 Motorway – Central Package, Building Condition and Public Utilities Assessment Report (GHD, 2021).

3.2 Minister's Conditions of Approval

The primary NSW CoA relevant to the development of this Plan are listed in Table 3-1. Secondary conditions relevant to this Plan have been listed in Appendix A. 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 No.	Condition Requirements	Document 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 activities will impact on their assets) and relevant council(s)	OCNVMP Section 1.6
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
	(e) measures to minimise cumulative construction impacts and the likelihood for construction fatigue from both concurrent activities and other projects in the area.	Section 6.3 Section 8

CoA No.	Condition Requirements	Document 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;	Section 9.3 Section 3.2 of Appendix B
	(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 3.5 and 3.6 of Appendix B
	(c) method and frequency for reporting monitoring results; and	Section 9.6 Section 6.2 of Appendix B
	(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 4 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	Section 5.3.2

No.	Condition Requirements	Document Reference
	(c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour. For the purposes of this condition, 'continuously' includes any period during which there is less than one 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. (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 atany 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 (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 inrespect of the CSSI; or (ii) works which are <u>not</u> subject to an EPL that are approved under an **Out-of-Hours Work Protocol** as required by **Condition E37**; or	Section 5.3.3

No.	Condition Requirements	Document Reference
	(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: (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; (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.	OCEMP Section 8.2 Appendix C
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	Section 2.3 Section 8

No.	Condition Requirements	Document Reference
	(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.*	
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 8.6, NV33
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 8.1 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.	OCS Communication and Engagement Strategy Section 8.6, NV22
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 8.6, NV23

No.	Condition Requirements	Document Reference
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 5.6.4 Section 8.6, NV24
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 6.3 Section 8.6, NV32, NV34 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. 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.	Section 8.6, NV37 Section 8.7 Appendix C
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.	Section 8.2.3 Appendix C

No.	Condition Requirements	Document Reference
	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. *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 8.6, NV36
E49	Blasting is not permitted as part of this CSSI approval.	Section 8.6, NV4
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 8.6, NV30
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 8.6, NV26 Section 9.6
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	Section 8.6, NV27

CoA No.	Condition Requirements	Document Reference
	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 9.6

3.3 Revised Environmental Management Measures

The primary REMMs relevant to the development of this Plan are listed in Table 3-2. Secondary REMMs relevant to this Plan are listed in Appendix A. 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	Document 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	This Plan
	• Identify nearby sensitive receivers		Section 4.1
	• Include a description of the construction activities equipment and working hours		Section 5.3 and Section 7.1
	• Identify relevant noise and vibration performance criteria for the project and license and approval conditions.		Section 5
	• Include modelling results showing construction noise impacts based on detailed design information		Section 7

ID	Measure/Requirement	Timing	Document Reference
	• 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 8.2.2 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 9.3 Appendix B
	• Describe community consultation and complaints handling procedures in accordance with the Community Communication Strategy to be developed for the project		Sections 8.3, 8.4
	• 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 6.3 Section 8
	• Outline requirements to minimise and manage construction fatigue, in consultation with the community.		Section 6.3 Section 8

3.4 Environment Protection Licence

The M12 Central package is subject to an Environment Protection Licence (EPL) No. 21596 as a Scheduled Activity for 'road construction'. The EPL includes clauses requiring the licensee to minimise and control noise and vibration impacts from the premises. The M12 Central package will be constructed so as to meet the noise and vibration requirements identified in the EPL.

3.5 TfNSW QA Specifications

The TfNSW QA 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.

This CNVMP incorporates the relevant requirements to noise and vibration from the TfNSW QA Specifications prepared for the *M12 Motorway (Central), Construction between Badgerys Creek and the Water Tower Access Road, Cecil Hills* including:

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

The specifications set out environmental protection requirements, including Hold Points and Witness Points that must be complied with during construction of the M12 Central package. A Hold Point is a point beyond which a work process must not proceed without express written authorisation from TfNSW. Witness Points are an identified point in the process where TfNSW request to, review, witness, inspect method and/or process of work. The activities, however, may proceed. For processes under the CEMP, the request for release of Hold Points and Witness Points is to be made through the TfNSW ESM (or delegate).

Details of the Hold Points and Witness Points relevant to this Plan are outlined in Section 9.4.

Cross references are included in Appendix A, to indicate where the relevant TfNSW QA specifications have been addressed in this Plan or other Project documents.

4 Existing environment

This section summarises the existing noise and vibration conditions within and adjacent to the M12 Central package, based on information contained in the Environmental Assessment Documentation. The information provided below comprises the baseline data used for the Construction Noise and Vibration Monitoring Program (Appendix B). As referenced in the Amendment Report, it is considered that the baseline data obtained during the EIS is sufficiently comprehensive and that no further baseline data will be required to be collected. 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.

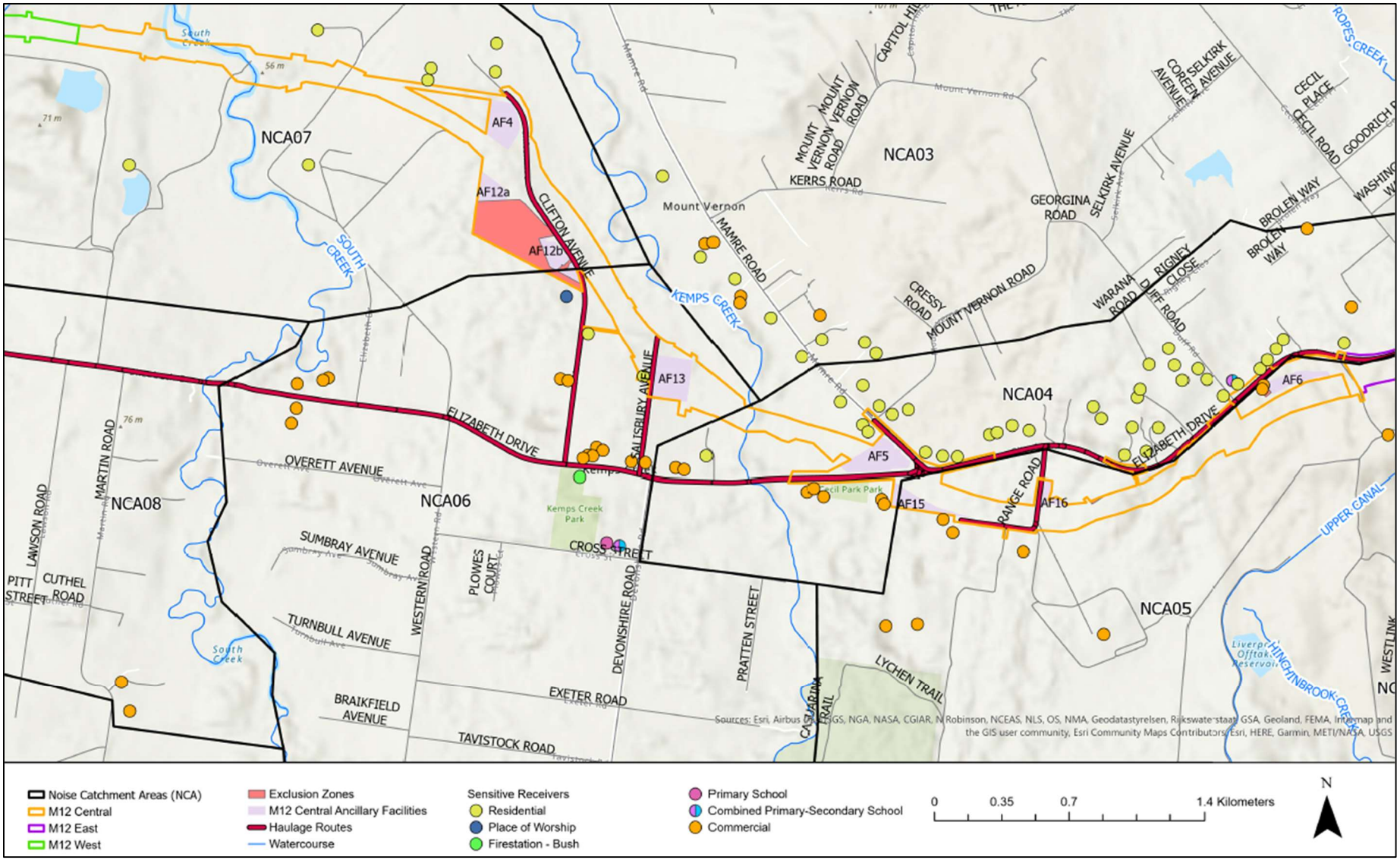
4.1 Sensitive receivers

The M12 Central package is situated within three local government areas (LGAs); Penrith to the north, Fairfield to the east and Liverpool to the south. The M12 Central package will also pass through the Western Sydney Parklands at its eastern extent. The M12 Central package will traverse the following suburbs from east to west; Cecil Park, Cecil Hills, Mount Vernon, Kemps Creek, and Badgerys Creek.

The study area includes a mix of rural and suburban areas. Cecil Hills, Cecil Park and Mount Vernon (small-lot rural residential areas) are located in the eastern section of the construction footprint near to the M7 Motorway and Elizabeth Drive. Kemps Creek and Badgerys Creek are in the western section of the construction footprint and are sparsely populated, consisting 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 M12 Central package. 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. The alignment of the M12 Central package is mainly through semi-rural properties with few residences.

Noise sensitive receivers and the Noise Catchment Areas (NCAs) for the M12 Central package are shown in Figure 4-1. The predicted noise contours for the M12 Central package are provided in the Overarching and Standard Hours Noise and Vibration Impact Statement. Project wide 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.


NCA07
NCA08
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NCA03
NCA05
AF4
AF12a
AF12b
AF13
AF5
AF6
AF15
AF16
CLIFTON AVENUE
SALISBURY AVENUE
ELIZABETH DRIVE
OVERETT AVENUE
SUMBRAY AVENUE
CROSS STREET
TURNBULL AVENUE
BRAIKFIELD AVENUE
EXETER ROAD
TAVISTOCK ROAD
MARTIN ROAD
LAWSON ROAD
PITT STREET
CUTHEL ROAD
WESTERN ROAD
PLOWES COURT
DEVONSHIRE ROAD
PRATTEN STREET
CASUARINA TRAIL
LYCHEN TRAIL
KEMPS CREEK
SOUTH CREEK
MAMRE ROAD
Mount Vernon
KERRS ROAD
MOUNT VERNON ROAD
CAPITOL HILL
SELKIRK AVENUE
CORFEN AVENUE
CECIL PLACE
CECIL ROAD
GOODRICH
GEORGINA ROAD
BROLEN WAY
CRESSY ROAD
WARANA ROAD
RIGNEY CLOSE
RANGE ROAD
UPPER CANAL
HINCHINBROOK CREEK
ROPES CREEK
Kemps Creek Park
Cecil Park Park
Noise Catchment Areas (NCA)
M12 Central
M12 East
M12 West
Exclusion Zones
M12 Central Ancillary Facilities
Haulage Routes
Watercourse
Sensitive Receivers
Residential
Place of Worship
Firestation - Bush
Primary School
Combined Primary-Secondary School
Commercial
0
0.35
0.7
1.4 Kilometers
N

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

4.2 Noise catchment areas

The area around the M12 Central package has been summarised using five NCAs which collectively make up the study area. The NCAs were selected to be representative of the varying land uses and noise environment of sensitive receiver locations around the M12 Central package.

NCAs that reflect land uses and the nature and types of receivers within each NCA were established as part of the noise assessment. NCA01, NCA02, NCA08, NCA09, NCA10 assessed as part of the Environmental Assessment Documentation are not significantly impacted by the M12 Central package. The land use characteristics within the relevant NCAs are described in Table 4-1.

Table 4-1: Noise catchment areas relevant to the M12 Central package

NCA	Minimum distance[1]	Description
NCA03	440 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 construction footprint on Mamre Road.
NCA04	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 Street. It is primarily residential with the nearest receivers located adjacent the construction footprint to the north of Elizabeth Drive.
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
NCA06	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.
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 construction footprint.

Notes:

(1) Approximate minimum horizontal distance in metres from the construction footprint to the nearest sensitive receiver.

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.

Unattended noise surveys in and around the M12 Central package were conducted at five 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 M12 Central package. The monitoring equipment was generally located at receivers which will have line-of-sight to the M12 Central package or to existing major roads, within constraints such as accessibility, security and permission of landowners.

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.

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	Background noise (RBL) Periods based on extended construction hours[1]					Average noise level LA_{eq} (period) based on Road Noise Policy[2]	
	Morning shoulder	Day	Evening	Evening shoulder	Night	Day 15 hour	Night 9 hour
L02	47	36	39	41	34	46	45
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

Notes:

(1) 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

(2) 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.

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 in this section.

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, which was sourced from the Table 2 of the ICNG, shows how NMLs at residential receivers are determined and how they are to be applied. The rating background level (RBL) is used as the basis for determining the 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). The term RBL is described in detail in the *Noise Policy for Industry* (EPA, 2017).

Calculated NMLs for each relevant NCA for the M12 Central package is provided in Table 5-4.

Table 5-1: Residential NML guideline

Time of Day[1]	LAeq(15minute)	How to Apply
Standard hours Monday to Friday 7:00 am to 6:00 pm Saturday 8:00 am to 1:00 pm No work on Sundays or public holidays	RBL + 10 dBA	• The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured LAeq(15minute) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practises to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.

Standard Highly Noise Affected hours
Monday to Friday 8:00 am to 6:00 pm
AND
Saturday 8:00 am to 1:00 pm
In continuous blocks not exceeding three (3) hours each with a minimum respite from those activities and works of not less than one (1) hour between each block.
No work on Sundays or public holidays
	Highly Noise Affected 75 dBA	• The Highly Noise Affected (HNA) level represents the point above which there may be strong community reaction to noise.
		• Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restructuring the hours that the very noisy activities can occur, considering:
		  • Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools or mid-morning or mid-afternoon for works near residences.
		  • If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

Outside recommended standard hours	RBL + 5 dBA	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practises have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community.

Notes:

(1) Saturday 1pm to 6pm has been identified as work hours in accordance with NSW CoA E34, however fall within "outside recommended standard hours" and are classified as Daytime OOHW.

5.2.2 Sleep Disturbance

Where construction works are planned to extend over more than two consecutive nights, the ICNG recommends that an assessment of sleep disturbance impacts be completed. The most recent guidance in relation to sleep disturbance is contained in the Noise Policy for Industry (2017). The current approach to identifying potential sleep disturbance impacts is to set a screening criterion 15

dB above the RBL (or >65dB whichever is lower), or >40dB ground-borne noise, during the night-time period (10.00 pm to 7.00 am).

The term 'screening criterion' indicates a noise level that is intended as a guide to identify the likelihood of sleep disturbance. It is not a firm criterion to be met, however where the criterion is met, sleep disturbance is unlikely. When the screening criterion is not met, a more detailed analysis is required.

5.2.3 Other sensitive land uses

Other sensitive land uses, such as offices and schools, 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. Consultation will be undertaken with noise sensitive land use occupants likely to be affected by noise from the M12 Central package to schedule construction activities and work hours to achieve a reasonable noise outcome.

The NML in Table 5-2 are five decibels 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.

5.2.4 Construction Road Traffic Noise Guidelines

When trucks and other vehicles are operating within the boundaries of construction sites, road vehicle noise contributions are included in the predicted LAeq(15minute) noise emissions and assessed against the ICNG criteria in Section 5.2.1. When construction related traffic moves onto the public road network a different noise assessment methodology is appropriate, as vehicle

movements are regarded as 'additional road traffic' rather than as part of the works and are assessed under the RMS Road Noise Policy (RNP).

As required by the RNP, an initial screening test should first be applied by evaluating whether noise levels would increase by more than 2 dB (an increase in the number vehicles of around 60%) due to construction traffic or a temporary reroute due to a road closure. Where noise levels increase by more than 2 dB (i.e. 2.1 dB or greater) further assessment is required using the criteria presented in the RNP, as reproduced in Table 5-3.

Table 5-3: RNP Criteria for Assessing Construction Vehicles on Public Roads

Road Category	Type of Project/Land Use	Assessment Criteria	
		Daytime (7am 10pm)	Night time (10pm 7am)
Freeway/ arterial/sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	LAeq(15hour) 60 (external)	LAeq(9hour) 55 (external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	LAeq(1hour) 55 (external)	LAeq(1hour) 50 (external)

5.3 Working hours

5.3.1 Hours of work

In accordance with TfNSW QA specification G1 (Job Specific Requirements), the contractual working days and nights of work 'standard construction hours' for the M12 Central package are between 7:00 am to 6:00 pm Monday to Friday inclusive but excluding public holidays and rostered days off.

In accordance with NSW CoA E34 and the EPL condition L5.1, the approved standard hours are:

- 7:00 am to 6:00 pm Monday to Friday
- 8:00 am to 6:00 pm Saturday
- At no time on Sunday or public holidays.

Seymour Whyte must submit a request to TfNSW to work outside of the contractual working hours in TfNSW QA specification G1. Any application for OOHW is to demonstrate that the proposed OOHW is compliant with the relevant CoA and EPL conditions. The TfNSW contract manager (or delegated person) would forward the relevant OOHW application to the TfNSW Environment team, TfNSW Comms and ER for information and comment. The TfNSW contract manager (or delegated person) approves the OOHW in accordance with G1 based on advice from TfNSW Environment team, TfNSW Comms and the ER.

TfNSW are to be notified of any work to be undertaken between 8:00am and 6:00pm on Saturdays (the allowable work hours on Saturdays identified in the Infrastructure Approval) and must be notified no later than 12:00 pm on the Thursday immediately prior to the Saturday proposed to

undertake work. This notification will typically occur through TfNSW's review and approval of draft community notifications.

The application must include the details of the work activities to be undertaken and use the form provided in the OOHW Procedure (Appendix C). TfNSW and/or the ER may request a copy of the OOHW Permit, including evidence to justify the need for work on Saturdays.

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.

The Infrastructure Approval defines highly noise intensive works as those identified as 'annoying' under the ICNG and includes:

- 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 M12 Central package will require various highly noise intensive work activities including those listed above. The proposed equipment including any highly noise intensive equipment will be identified within the Overarching and Standard Hours Noise NVIS, or activity specific NVIS, and given a 5 dB penalty in the noise modelling.

For any works undertaken outside of the standard hours of works that involves the use of highly noise intensive work, Seymour Whyte will consider, wherever reasonable and feasible:

- Use of alternative quieter plant and equipment
- Planning works during less noise sensitive periods (e.g. try and complete highly noise intensive works as early in the night as possible)
- Schedule highly noise intensive equipment prior to 10 pm and/or midnight
- Where the above cannot be achieved, the equipment will be used prior to midnight.

Note – there may be instances where Highly Noise Intensive Work will be required after 10 pm and/or midnight as outlined above. Examples where this might occur include specific conditions detailed in the Road Occupancy License (ROL), reinstating trafficable areas using whacker packers and asphalting plant at the end of applicable shifts.

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

5.3.3 Variation to hours of work

Notwithstanding the approved standard hours in Section 5.3.1, works associated with the M12 Central package may be undertaken outside of the approved standard hours if one or more of the following circumstances apply 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 (emergency work)
- 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).
  - 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, 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.

Construction would be undertaken during the standard construction hours wherever possible. Where construction cannot be undertaken during standard construction hours, works or activities that cannot be undertaken during standard construction hours will be scheduled on Saturday (within the approved standard hours) or as early as possible during the evening and/or night-time periods. Works will be scheduled with the following hierarchy, in accordance with the CNVG:

1. 8:00 am to 6:00 pm Saturday
2. 8:00 am to 6:00 pm Sunday (or public holidays) or 6:00 pm to 10:00pm weekdays
3. 10:00 pm to 7:00 am weekday nights
4. 10:00 pm to 8:00 am Saturday night or 6:00 pm to 7:00 am Sunday or public holiday nights.

The mitigation and management of out of hours works is provided in Section 8.

5.3.4 Timetabling of work activities

Work activities for the M12 Central package will be timetabled to be carried out during the standard construction hours where possible. This applies in particular to excavation, demolition or rock breaking activities and for activities concentrated in a single area (i.e. activities that do not move along the alignment, and/or do not require OOH activities for safety reasons, duration respite or to minimise disruption to road networks).

Where work outside of the standard construction hours is planned to take place the following hierarchy of preferred working hours must be considered when timetabling works unless otherwise agreed with affected community through consultation (Section 8.3).

1. Saturday morning periods between 8am and 1pm (approved standard hours)
2. Saturday afternoon periods between 1pm and 6pm (Daytime OOH, also applicable to HNIW)
3. Sunday and public holiday day periods between 8am and 6pm (Period 1 Day)
4. Weekday evening periods between 6pm and 10pm (Period 1 Evening)
5. Weekend evening periods between 6pm and 10pm (Saturdays Period 1 Evening/Sundays Period 2)
6. Weekend night periods between 10pm and 8am (Period 2)
7. Work during the weekday evening and night and scheduling the noisiest or vibration intensive work first (between 6pm and 10pm) to minimise sleep disturbance impacts in the night period between 10pm and 7am) (Period 1 Evening & Period 2)
8. All other times outside recommended standard hours.

This hierarchy does not apply to Emergency Work.

Timetabling of work activities must also take into account the appropriate respite periods and duration reduction preferences determined in consultation with the community / noise sensitive receivers at each affected location on a regular basis (see Section 8.2.3 for more details).

The ESR (or delegate) and Community Relations Manager (or delegate) will attend project scheduling meetings as required to assist the construction teams with the management of work scheduling to minimise works outside of the standard construction hours. Further detail on specific timetabling and justification for undertaking works outside of the standard construction hours will be included in Noise and Vibration Impact Statements for proposed work activities.

5.4 Adopted construction noise management levels

The adopted construction NMLs for each relevant NCA has been determined based on the measured noise levels described in Section 4.3.

For work during approved standard 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 the approved standard hours, additional construction NMLs for these times have also been determined.

For work outside approved standard 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 construction NMLs and sleep disturbance screening criterion for residential receivers of the M12 Central package are provided in Table 5-4. 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 5-2 sets out the adopted construction NMLs for non-residential receivers.

Table 5-4: M12 Central package construction NMLs and sleep disturbance screening criteria at residences

NCA	Monitoring location	NML LAeq(15min) (dBA)						
		Standard construction (RBL + 10dB)	Out of hours (RBL + 5dB)					Sleep disturbance screening criteria (RBL + 15 dB)
		Day[1]	Morning shoulder[2]	Day[3]	Evening[4]	Evening shoulder[5]	Night[6]	
NCA03	L05	49	44	44	44	44	40	50
NCA04	L03	64	59	59	53	53	42	52
NCA05	L02	46	41	41	41	41	39	49
NCA06	L05	49	44	44	44	44	40	50
NCA07	L06	44	39	39	39	39	36	46

Notes:

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

(2) 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

(3) 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

(4) 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

(5) 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

(6) 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

5.5 Construction vibration assessment objectives

The following construction vibration goals apply for the M12 Central package:

- 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 Construction 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 Disturbance to building occupants (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/s^2) 1-80 Hz

Location	Assessment period[1]	Preferred Values		Maximum Values	
		z axis	x and y axis	z axis	x and y axis
Continuous vibration					
Critical areas[2]	Day or night-time	0.0050	0.0036	0.010	0.0072
Residences	Daytime	0.010	0.0071	0.020	0.014
	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
Residences	Daytime	0.30	0.21	0.60	0.42
	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

(2) Such as hospital operating theatres or precision laboratories.

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.

Intermittent vibration criteria for human comfort, such as from drilling, compacting or other sources which operate intermittently, but which would produce continuous vibration if operated continuously, is presented in Table 5-6. This type of vibration is assessed on the basis of vibration dose values (VDV) and is identified as the most likely source of vibration impacts from the M12 Central package.

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

(2) E.g. Operating theatres, precision laboratories and other areas where vibration sensitive activities may occur.

5.6.2 Structural damage to buildings

Cosmetic damage vibration limits for buildings and associated minimum working distances are identified in the CNVG, British Standard *BS7385 Part 2-1993 Evaluation and measurement for vibration in buildings Part 2* (BS 7385) and German Standard *DIN 4150: Part 3-2016 Structural vibration – Effects of vibration on structures* (DIN 4150-3) (DIN, 1999).

The cosmetic damage levels set by BS7385 are considered ‘safe limits’ up to which no damage due to vibration effects has been observed for certain particular building types. Table 5-7 sets out the recommended vibration limits from BS7385 for transient vibration to ensure minimal risk of cosmetic damage to residential, commercial and industrial buildings and is frequency dependent and specific to particular categories of structure.

Table 5-7: Transient vibration guide values for minimal risk of cosmetic damage

Line	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and Above
1	Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures. Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Notes: Based on BS 7385-2

5.6.3 General vibration screening criterion

The guide values in Table 5-7 relate predominantly to transient vibration which does not give rise to resonant responses in structures and low-rise buildings. Where the dynamic loading caused by

continuous vibration may give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values may need to be reduced by up to 50%. Rock breaking / hammering activities are considered to have the potential to cause dynamic loading in some structures (e.g. residences) and it is therefore appropriate to reduce the transient values by 50%.

For construction activities involving intermittent vibration sources such as rock breakers, piling rigs, vibratory rollers and excavators, the predominant vibration energy occurs at frequencies greater than 4 Hz (and usually in the 10 Hz to 100 Hz range). On this basis, a conservative vibration damage screening level per receiver type is:

- Reinforced or framed structures: 25.0 mm/s
- Unreinforced or light framed structures: 7.5 mm/s.

At locations where the predicted and/or measured vibration levels are greater than shown above (peak component particle velocity) monitoring will be performed during construction. At these locations a more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure would be undertaken to determine the applicable safe vibration level.

5.6.4 Heritage buildings and items

Where structures are more sensitive such as heritage buildings and items, more stringent conditions may be applicable and will be considered on a case-by-case basis.

The 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 as shown in Table 5-8.

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

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

Notes:

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

As noted in BS 7385, heritage buildings and structures should not be assumed to be more sensitive to vibration, unless structurally unsound.

To evaluate the effects of long-term (or harmonic) vibration on structures, the lowest criterion of 2.5 mm/s (PPV) in DIN4150 is often used for heritage buildings and items. Whilst this approach is generally agreed to be conservative, it is nevertheless adopted as the default screening vibration level for heritage and other sensitive structures on a large number of construction projects. This screening level will allow potentially impacted heritage structures to be identified.

The approach for the M12 Central package to manage potential vibration impact on heritage structures shall be to:

- Identify heritage items where the 2.5 mm/s peak component particle velocity objective may be exceeded during specific construction activities; and
- Conduct a structural engineering assessment including an inspection to confirm the structural integrity of the building/item and confirm if it is 'structurally sound'.
- If the building/item is confirmed as 'structurally sound', the screening criteria in Sections 5.6.2 and 5.6.3 (as applicable) shall be adopted, or
- If the building/item is confirmed as 'structurally unsound', the more conservative cosmetic damage objectives of 2.5 mm/s peak component particle velocity shall be adopted.

In addition, the Overarching and Standard Hours NVIS identified one item of heritage value (Fleurs Aerodrome metal structure) that require specific evaluation to manage potential vibration impacts during construction.

A heritage specialist (built structures) will be engaged 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.

5.6.5 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. Trigger alerts will be set where vibration monitoring in accordance with Jemena guidelines identifies vibration at 15mm/second. 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.

5.6.6 Safe working distances

Where vibration intensive plant such as rock breakers, piling rigs or 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 provides safe working distances as recommended by the CNVG for typical items of vibration intensive plant that must be complied with unless otherwise approved by the TfNSW ESM or EPL as relevant.

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

Plant item	Rating/description	Safe working distance		
		Cosmetic damage (BS 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)	5 m	14 m	15 m to 20 m
	<100 kN (typically 2-4 t)	6 m	16 m	20 m
	<200 kN (typically 4-6 t)	12 m	33 m	40 m

Plant item	Rating/description	Safe working distance		
		Cosmetic damage (BS 7385) Light framed structures	Cosmetic damage (DIN 4150) Heritage and other sensitive structures	Human response (EPA's vibration guideline)
	<300 kN (typically 7-13 t)	15 m	41 m	100 m
	>300 kN (typically 13-18 t)	20 m	54 m	100 m
	>300 kN (> 18 t)	25 m	68 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.

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.

6 Environmental aspects and impacts

6.1 Construction activities

The M12 Central package will involve a range of activities incorporating various heavy machinery, plant and equipment that will operate in a number of locations across the alignment. 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 CEMP.

Modelling of noise and vibration shows that impacts attributable to the M12 Central package 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.

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 by TfNSW 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
3. 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, attended by Seymour Whyte (for the M12 Central package) and other Project packages as required.

To manage cumulative impacts, works will be scheduled with the aim of minimising concurrent works near sensitive receivers, including:

- Coordination between Project packages and other CSSI, SSI and SSD projects that are being constructed nearby, including discussions at interface meetings organised and/or attended by relevant Seymour Whyte personnel
- 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 Procedure (Appendix C).

Construction fatigue will be managed through the implementation of the mitigation measures provided in Section 8, the OOHW Procedure (Appendix C) and the CSEP which has been prepared in accordance with the OCS, which includes a Construction Fatigue Protocol to minimise impacts associated with construction fatigue. The Construction Fatigue Protocol includes consideration of noise attenuation and restriction of OOHW or use of noise intensive equipment where reasonable and feasible in accordance with REMM G01.

7 Construction noise and vibration assessment

A range of plant and equipment will be required to undertake activities associated with the M12 Central package. A summary of anticipated construction scenarios and predicted noise and vibration levels is provided in this section.

7.1 Construction activities

Table 7-1 provides a summary of the construction phases for the M12 Central package and description of activities anticipated to be used for the phase.

Table 7-1: Construction scenarios and associated activities

reference no.	scenario	Description
1a	Ancillary facility establishment/ decommissioning – Peak impact	Before construction begins, ancillary facilities will be established to allow construction works to occur. The works will vary depending on location and the existing conditions but could include: • Minor clearing • 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 (but not limited to): excavators, chainsaws, road saws and front-end loaders. These works would be predominately undertaken during standard hours.
1b	Ancillary facility establishment/ decommissioning – Typical impact	
2a	Ancillary facilities – Operation	Ancillary facilities will generally comprise: • Temporary buildings (generally prefabricated) including offices 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) • Hardstand parking areas with sufficient space to accommodate the numbers of construction workers expected at any site • Materials laydown, storage and handling areas, including purpose built temporary structures as required • Batching plant • Crushing, grinding and screening operations. These works would be predominately undertaken during standard hours.
2b	Ancillary facilities – Stockpiling	
2c	Ancillary facilities – Batching plant	
2d	Ancillary facilities – Crushing activities	

Scenario reference no.	Construction scenario	Description
		The site layout of all ancillary facilities is considered indicative and will be confirmed as the project progresses. • 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 determined following confirmation of the site layout.
3a	Utilities and drainage - including relocation of existing - Peak impact	The M12 Central package requires 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 of (but not limited to): rock-breakers. These works would be undertaken during standard hours where practicable, however it is likely that these activities will be required to occur outside of standard hours to minimise traffic disruption and impacts to utilities consumers.
3b	Utilities and drainage - including relocation of existing - Typical impact	
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: • Buildings, sheds or farm infrastructure that fall within the construction footprint • A bridge crossing South Creek on private property. Peak noise impact works will be required at certain times and will include the use of (but not limited to): rock-breakers. These works would be predominately undertaken during standard hours.
4b	Demolition - bridges and buildings (no breaker)	
5a	Clearing - Peak impact	Vegetation and topsoil will be stripped before earthworks are carried out. This is likely to involve: • Removal of vegetation • Topsoil stripping. Peak noise impact works will be required at certain times and will include the use of (but not limited to): chainsaws and chippers. These works would be predominately undertaken during standard hours.
5b	Clearing - Typical impact	
6a	Earthworks - Peak impact	Earthworks will be required along the entire alignment, including:

Scenario reference no.	Construction scenario	Description
6b	Earthworks - Typical impact	• Areas of new cut and fill along the construction footprint, including at all interchanges • 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 (but not limited to): dozers or graders. These works would be predominately undertaken during standard hours.
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. These works would be predominately undertaken during standard hours.
7a	Bridge works - Peak impact (including piling)	Construction of the bridges will generally involve: • Construction of foundations (piling) • Construction of bridge piers • Construction of bridge abutments and spill-throughs where required • Installation of pre-cast concrete planks/girders and barriers • Installation of the deck • 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.
7b	Bridge works - Typical impact	
7c	Bridge works - concrete works	
7d	Bridge works - girder lifts over existing roads	
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 will likely be required to occur outside of standard hours to minimise traffic impacts. Peak noise impact works will be required at certain times and will include the use of (but not limited to): concrete saws.
8b	Road works - Typical impact	
8c	Road works - tie-in works to existing roads	
9a	Signage, lighting and landscaping - installation and finishing works	Finishing works are required and include activities such as line marking, installing signs, etc. Installation and finishing work generally have no requirement for peak noise impact equipment, though high noise impact works may be required at certain times such as (but not limited to): road/demo saws, core drills for signage / paving cutting where required. These works would be predominately undertaken during standard hours.

7.2 Construction noise impacts

7.2.1 General construction noise impacts

A summary of the potential impacts to receivers for each relevant NCA from standard hours (daytime) and out-of-hours construction scenarios as identified in the Environmental Assessment Documents is presented in Table 7-2 to Table 7-6. These construction scenarios 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.

The tables provide an assessment against Table C.1 of the CNVG (represented as Table 8-4 in this Plan) and demonstrates the requirement (or not) for additional mitigation measures. (There have been refinements in construction footprint and construction methodology that may have changed the potential impacts. As such, construction impacts in the Overarching and Standard Hours NVIS or subsequent activity specific NVIS should be referred to determine specific and 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.

As part of the Overarching and Standard Hours Noise and Vibration Impact Statement (Section 8.1), detailed activity specific construction scenarios, timings, offset distances, equipment and concurrent / overlapping activities have been identified and assessed. Further assessment will be undertaken in Noise and Vibration Impact Statements to be developed and approved prior to specific activities, particularly OOHW being undertaken.

Construction noise and vibration impacts are to be determined, in accordance with the ICNG and CNVG, and activity specific management and mitigation measures identified as implemented in accordance with this CNVMP.

Generally, construction work will be undertaken in standard construction hours whenever practicable and/or timetabled in accordance with Section 5.3.4. Some activities, such as bridgeworks, paving and operation of ancillary facilities may occur outside of the approved standard hours in accordance with the requirements of NSW CoA E36 and the EPL.

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

Period	ID	Scenario	Activity	Noise Catchment Area				
				NCA03	NCA04	NCA05	NCA06	NCA07
Morning Shoulder (OOHW Period 2)	1a	Ancillary facility establishment	Peak impact					
	1b		Typical impact					
	2a	Ancillary facilities operations	Operation					
	2b		Stockpiling					
	2c		Batching plant					
	2d		Crushing works					
	3a	Utilities and drainage	Peak impact					
	3b		Typical impact					
	4a	Demolition	Peak impact					
	4b		Typical impact					
	5a	Clearing	Peak impact					
	5b		Typical impact					
	6a	Earthworks	Peak impact					
	6b		Typical impact					
	6c		Onsite truck haulage					
	7a	Bridge works	Peak impact					
	7b		Typical impact					
	7c		Concrete works					
	7d		Girder lifts					
	8a	Road works	Concrete works					
	8b		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)

Note: Based on construction scenarios as identified in the Environmental Assessment Documents. Refer to Overarching and Standard Hour NVIS or subsequent activity specific NVIS when planning specific and additional mitigation measures.

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

Period	ID	Scenario	Activity	Noise Catchment Area				
				NCA 03	NCA 04	NCA 05	NCA 06	NCA 07
Standard Daytime Hours	1a	Ancillary facility establishment	Peak impact					
	1b		Typical impact					
	2a	Ancillary facilities operations	Operation					
	2b		Stockpiling					
	2c		Batching plant					
	2d		Crushing works					
	3a	Utilities and drainage	Peak impact					
	3b		Typical impact					
	4a	Demolition	Peak impact					
	4b		Typical impact					
	5a	Clearing	Peak impact					
	5b		Typical impact					
	6a	Earthworks	Peak impact					
	6b		Typical impact					
	6c		Onsite truck haulage					
	7a	Bridge works	Peak impact					
	7b		Typical impact					
	7c		Concrete works					
	7d		Girder lifts					
	8a	Road works	Concrete works					
	8b		Typical works					
	8c		Tie-in works					
	9a	Signage, lighting and landscaping						

Legend:
Receiver Perception (dB above NML):
Noticeable (0 dB) Clearly Audible (1dB to 9dB) Moderately Intrusive (10dB to 20dB)
Highly Intrusive (>20dB)

Note: Based on construction scenarios as identified in the Environmental Assessment Documents. Refer to Overarching and Standard Hour NVIS or subsequent activity specific NVIS when planning specific and additional mitigation measures.

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

Period	ID	Scenario	Activity	Noise Catchment Area				
				NCA 03	NCA 04	NCA 05	NCA 06	NCA 07
Evening Shoulder (OOHW Period 1)	1a	Ancillary facility establishment	Peak impact					
	1b		Typical impact					
	2a	Ancillary facilities operations	Operation					
	2b		Stockpiling					
	2c		Batching plant					
	2d		Crushing works					
	3a	Utilities and drainage	Peak impact					
	3b		Typical impact					
	4a	Demolition	Peak impact					
	4b		Typical impact					
	5a	Clearing	Peak impact					
	5b		Typical impact					
	6a	Earthworks	Peak impact					
	6b		Typical impact					
	6c		Onsite truck haulage					
	7a	Bridge works	Peak impact					
	7b		Typical impact					
	7c		Concrete works					
	7d		Girder lifts					
	8a	Road works	Concrete works					
	8b		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)

Note: Based on construction scenarios as identified in the Environmental Assessment Documents. Refer to Overarching and Standard Hour NVIS or subsequent activity specific NVIS when planning specific and additional mitigation measures.

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

Period	ID	Scenario	Activity	Noise Catchment Area				
				NCA 03	NCA 04	NCA 05	NCA 06	NCA 07
Evening (OOHW Period 1)	1a	Ancillary facility establishment	Peak impact					
	1b		Typical impact					
	2a	Ancillary facilities operations	Operation					
	2b		Stockpiling					
	2c		Batching plant					
	2d		Crushing works					
	3a	Utilities and drainage	Peak impact					
	3b		Typical impact					
	4a	Demolition	Peak impact					
	4b		Typical impact					
	5a	Clearing	Peak impact					
	5b		Typical impact					
	6a	Earthworks	Peak impact					
	6b		Typical impact					
	6c		Onsite truck haulage					
	7a	Bridge works	Peak impact					
	7b		Typical impact					
	7c		Concrete works					
	7d		Girder lifts					
	8a	Road works	Concrete works					
	8b		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)

Note: Based on construction scenarios as identified in the Environmental Assessment Documents. Refer to Overarching and Standard Hour NVIS or subsequent activity specific NVIS when planning specific and additional mitigation measures.

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

Period	ID	Scenario	Activity	Noise Catchment Area				
				NCA 03	NCA 04	NCA 05	NCA 06	NCA 07
Night time (OOHW Period 2)	1a	Ancillary facility establishment	Peak impact					
	1b		Typical impact					
	2a	Ancillary facilities operations	Operation					
	2b		Stockpiling					
	2c		Batching plant					
	2d		Crushing works					
	3a	Utilities and drainage	Peak impact					
	3b		Typical impact					
	4a	Demolition	Peak impact					
	4b		Typical impact					
	5a	Clearing	Peak impact					
	5b		Typical impact					
	6a	Earthworks	Peak impact					
	6b		Typical impact					
	6c		Onsite truck haulage					
	7a	Bridge works	Peak impact					
	7b		Typical impact					
	7c		Concrete works					
	7d		Girder lifts					
	8a	Road works	Concrete works					
	8b		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)

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 7-7.

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

Scenario	Activity	Noise Catchment Area				
		NCA03	NCA04	NCA05	NCA06	NCA07
Ancillary facility establishment	Peak impact				1	
Utilities and drainage	Peak impact		2		1	1
Clearing	Peak impact		1		1	1
Earthworks	Peak impact		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 NCA04 and NCA05
- The closest School (Irfan College) is located in NCA04. Under Option 1 presented in the Amendment Report it is likely to be subject to 'moderate impacts' during worst-case scenarios when noise intensive equipment is being used. Under Option 2 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
- 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 construction footprint in NCA04 and NCA05
- 'Other' sensitive receivers in the study area are not expected to be impacted by construction of the M12 Central package.

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.

7.2.2 Ancillary facility and stockpile operation (including access)

Temporary ancillary facilities required for the M12 Central package will include compounds and laydown areas. The locations of the ancillary facilities assessed in the Environmental Assessment Documentation 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) are described in the Site Establishment Management Plan (SEMP), prepared in accordance with NSW CoA A16. The SEMP will be prepared prior to the establishment of any ancillary facility (other than minor ancillary facilities).

The SEMP details all sites intended for use as ancillary facilities for the M12 Central package. Any additional ancillary facilities identified 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 CEMP. 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 ICNG.

The establishment and operation of ancillary facilities and stockpile sites is to be carried out in accordance with the requirements of the EPL. No out of hours works are permitted at ancillary facilities unless undertaken in accordance with the EPL and the OOHW Procedure (Appendix C).

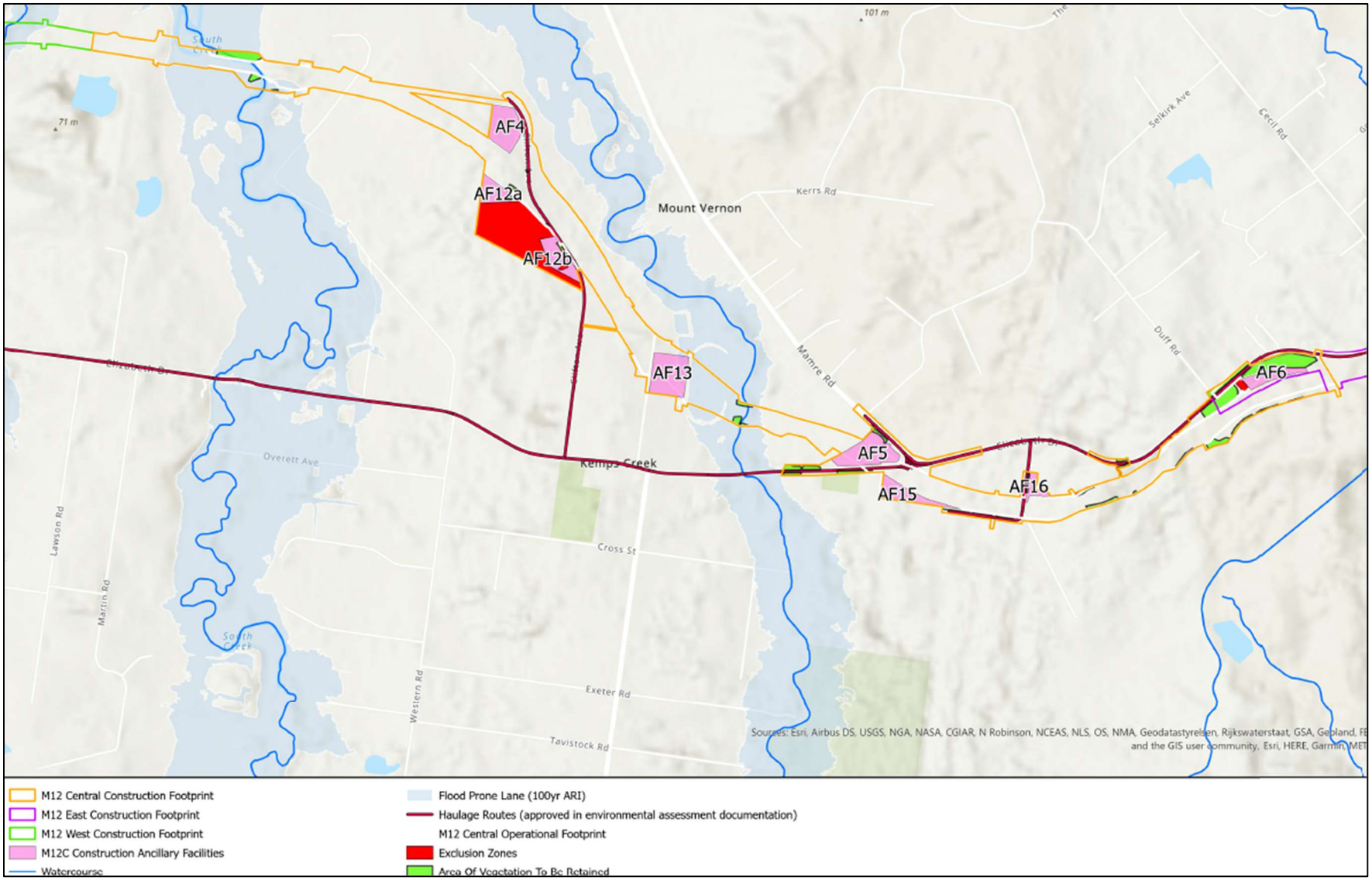

AF4
AF12a
AF12b
AF13
AF5
AF15
AF16
AF6
Mount Vernon
Kemps Creek
Kerrs Rd
Mamre Rd
Duff Rd
Selkirk Ave
Cecil Rd
Overett Ave
Cross St
Exeter Rd
Tavistock Rd
Western Rd
Martin Rd
Lawson Rd
South Creek
101 m
71 m
M12 Central Construction Footprint
M12 East Construction Footprint
M12 West Construction Footprint
M12C Construction Ancillary Facilities
Watercourse
Flood Prone Lane (100yr ARI)
Haulage Routes (approved in environmental assessment documentation)
M12 Central Operational Footprint
Exclusion Zones
Area Of Vegetation To Be Retained

Figure 7-1: Location of ancillary facilities

7.2.3 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, assessments of potential construction traffic noise are to be carried out 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 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.

7.2.4 At-property Treatments

TfNSW have engaged a suitably qualified consultant to install at-property treatments at impacted properties as they are confirmed within six months of the commencement of construction focussed on properties closest to the alignment first (greatest impact) and moving away from the alignment (least impact). Figure 7-2 details the indicative locations and types of at-property treatment for receivers located along the M12 Central package.

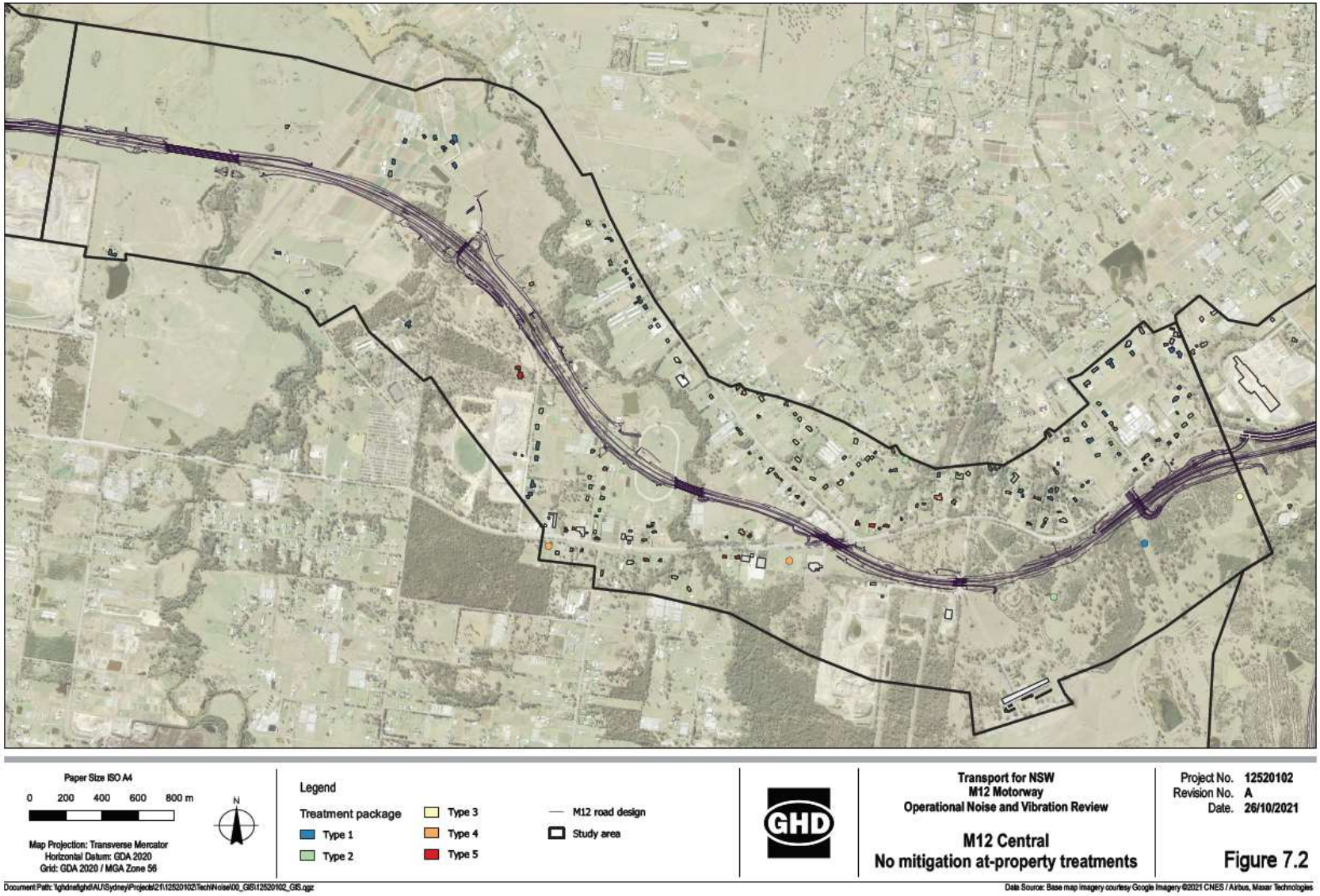
The types of at-property treatments detailed in the ONR have been calculated using the DRAFT *At-Receiver Noise Treatment Guideline* (ARNTG) (Roads and Maritime, 2018). Table 7-8 details the level of exceedance above the criteria following any noise reduction from quieter pavements. Details of the treatment packages are provided in Appendix B of the ARNTG and are dependent on the building construction material (Appendix E).

Table 7-8: Indicative treatment packages for M12 Central package

Treatment Package	Exceedance of criteria, dBA	Affected M12 Central residential properties	Affected M12 Central non residential properties
Type 1	1-5	64	1
Type 2	6-8	55	2
Type 3	9-11	42	1
Type 4	12-14	23	2
Type 5	>14	15	2
Total	**-**	**199**	**8**

Where at-property treatments 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 by TfNSW to DPHI in accordance with NSW CoA E55.

Other operational noise mitigation measures will be progressively installed to minimise construction noise impacts.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Map Projection: Transverse Mercator
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Grid: GDA 2020 / MGA Zone 56
Legend
Treatment package
Type 1
Type 2
Type 3
Type 4
Type 5
M12 road design
Study area
GHD
Transport for NSW
M12 Motorway
Operational Noise and Vibration Review
M12 Central
No mitigation at-property treatments
Project No. 12520102
Revision No. A
Date. 26/10/2021
Figure 7.2
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Data Source: Base map imagery courtesy Google Imagery ©2021 CNES / Airbus, Maxar Technologies

Figure 7-2: Indicative at property treatments for M12 Central package

7.3 Construction vibration impacts

7.3.1 Construction vibration assessment

Vibration impacts to residents and buildings are expected during construction of the M12 Central package. 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 M12 Central package 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 M12 Central package. 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, as detailed in the Amendment Report, about seven structures spread across primarily NCA07 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.

Detailed heritage assessments carried out as part of the EIS identified four heritage items as being potentially impacted by vibration for the M12 Central package:

- The Fleur radio telescope site
- Exeter farm archaeological site
- South Kemps and Badgerys Creek confluence weirs scenic landscape
- Fleurs Aerodrome

Where these heritage structures are located within or near the construction footprint, 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 OCS 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

8.1 Noise and Vibration Impact Statements

Noise and Vibration Impact Statements (NVIS) will be prepared and implemented for construction activities that may exceed the noise management levels and vibration criteria specified in NSW CoA E38 at any residence outside the construction hours identified in NSW CoA E34, or where receivers will be highly noise affected. The NVIS will include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures are to be implemented for the duration of the assessed activity.

A copy of each NVIS will be provided to the ER prior to the commencement of the associated activity. NVIS will supplement this Plan and include:

- A description of the proposed activities (construction scenarios), duration and associated plant proposed to be used
- Predicted noise and vibration levels based on background noise levels
- Examination of alternative methods of construction or innovative technologies that would potentially reduce noise and vibration if the potential noise and vibration exceeds the relevant criteria
- Description and commitment to work practices which limit noise and vibration
- Description of site specific noise and vibration mitigation treatments and time restrictions, including respite periods, duration, and frequency
- Justification for any activities to be undertaken outside the specified construction hours defined in NSW CoA E34 and E35
- Internal noise audit systems including recording of daily hours of construction, progressive impact assessments as work proceeds, conducting informal checks, providing active and communication links to Councils and surrounding residents and sensitive receivers
- Assessment of potential noise from the proposed construction methods including noise from construction vehicles and noise impacts from required traffic diversions
- Measures to coordinate M12 Central package works with other Project packages, or other construction and infrastructure projects
- Community consultation and notification
- Examination of all reasonable and feasible measures including any suggested by the ER or TfNSW
- Additional noise and vibration mitigation measures as negotiated with affected residents and other sensitive receivers.

Existing noise levels, pre-construction noise levels, or the like for the purposes of identifying rating background noise levels, noise management levels and construction noise impacts are noise levels that do not include any other construction related noise.

As part of the Overarching and Standard Hours Noise and Vibration Impact Statement developed prior to construction, detailed activity specific construction scenarios, timings, offset distances, equipment and concurrent / overlapping activities were identified and assessed. A copy of this NVIS will be provided to TfNSW and the ER prior to the commencement of construction. The Overarching and Standard Hours Noise and Vibration Impact Statement has determined which activities are likely to exceed the noise management levels and vibration criteria specified in NSW

CoA E38, or where receivers will be highly noise affected, for daytime activities. Further NVIS will be developed as required, e.g. for OOHW, to prior to the commencement of the associated activity.

The potential impacts arising from minor construction activities or ancillary facilities may be assessed in NVIS or using the TfNSW noise calculator where impacts are likely to be short term or low impact. These assessments will be provided to the ER prior to the commencement of the associated activity.

Copies of the NVIS will be provided to the Planning Secretary upon request.

8.2 Management of Out-of-Hours Work

8.2.1 Emergency work

Where out of hours work 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 (NSW CoA E36), the Environmental Site Representative (ESR) will notify the ER, the Planning Secretary and the EPA of the need for the emergency works. In addition, the construction team will use best endeavours to notify all affected sensitive receivers of the likely impact and duration of the emergency work.

8.2.2 Out-of-Hours Work Procedure

An Out-of-Hours Works Procedure (OOHW Procedure) has been prepared (see Appendix C) in accordance with the EPL and the overarching OOHW Protocol in the OCNVMP. The OOHW Procedure provides a process for the consideration, management and approval of work outside of the approved construction hours detailed in Section 5.3. The OOHW Procedure has also been prepared in accordance with the EPL, CNVG and TfNSW QA specifications.

The aim of the OOHW Procedure is to ensure that OOHW, follows a rigorous process to identify the associated risk of adverse impacts on sensitive receivers with regards to the OOHW and 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 OOHW Procedure will be prepared in consultation with and endorsed by the ER before commencement of OOHW. Amendments to the OOHW Procedure will be sent to the ER for endorsement.

Seymour Whyte must submit a request to TfNSW to work outside of the contractual working hours in TfNSW QA specification G1. Any application for OOHW is to demonstrate that the proposed OOHW is compliant with the relevant CoA and EPL conditions. The TfNSW contract manager (or delegated person) would forward the relevant OOHW application to the TfNSW Environment team, TfNSW Comms and ER for information and comment. The TfNSW contract manager (or delegated person) approves the OOHW in accordance with G1 based on advice from TfNSW Environment team, TfNSW Comms and the ER.

For OOHW, not subject to an EPL, works will be undertaken consistent with the requirements of the OOHW Protocol which forms part of the OCNVMP.

8.2.3 Community consultation on respite

In accordance with the consultation requirements outlined in NSW CoA E37 and E47, the community will be consulted to determine appropriate respite periods for OOHW at affected locations. 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).

Consultation will be undertaken using a range of consultation methods to optimise community engagement across the different land use types identified and in response to any COVID-19 health measures implemented. This will include phone calls, door knocks, calling cards, emails or community information sessions. Questions to assess the criteria in NSW CoA E47 will also be asked in response to community complaints regarding OOHW to encourage engagement from adversely affected receivers.

The affected community's preference for alternative hours and/or durations will be considered when confirming the schedule. The outcomes of the community consultation, the identified respite periods and the scheduling of the likely OOHW will be included in NSW CoA E47 Consultation reports that will be prepared on a quarterly basis (or more frequently if required).

The NSW CoA E47 Consultation reports will be provided to the EPA, ER and Planning Secretary for information prior to the work occurring.

In accordance with EPL condition L5.8, the consideration of respite will also include other Project packages, other CSSI, State Significant Infrastructure (SSI) and State Significant Development (SSD) projects in the area which may cause cumulative and/or consecutive impacts at the same noise sensitive receivers affected by construction of the M12 Central package to ensure respite periods are achieved.

Unless otherwise permitted through the EPL, works are to be scheduled to ensure that activities do not result in noise levels exceeding those specified in EPL condition L5.3 at the same noise sensitive receivers on more than:

- Two (2) consecutive evenings and/or nights at any time; and
- Three (3) evenings and/or nights per week; and
- 10 evenings and/or nights per month.

The provision of respite periods should not preclude the application of other construction noise management measures, including the provision of at receiver treatments and or alternate accommodation.

8.2.4 Road traffic noise

When planning OOHW, consideration must be given to minimising road traffic noise caused by construction of M12 Central package, including but not limited to:

- Restricting heavy vehicle movements to approved standard hours (Section 5); and/or
- Planning heavy vehicle haulage routes that have fewer sensitive receivers.

8.3 Communication

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 CNVG. TfNSW and Seymour Whyte 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 delivery of the M12 Central package with consideration of community impact, including procedures for notifying residents, business owners and other sensitive receivers, of any noise- or vibration-intensive 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 M12 Central package
- Potentially affected community, religious, educational institutions and noise and vibration-sensitive 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 Seymour Whyte and/or TfNSW and the sensitive receiver have made other arrangements (at no cost to the affected receiver) or the Planning Secretary has otherwise approved the works.

Further information on the procedures for managing community consultation and engagement, in accordance with NSW CoA B2, is provided in the CSEP.

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.

8.4 Complaints management

In accordance with NSW CoA B6, TfNSW have developed a Complaints Management System (CMS) to document the overall approach to complaints management for the Project. TfNSW will provide Seymour Whyte with the following information to facilitate complaint management:

- 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.

Seymour Whyte will adopt the relevant requirements of the CMS, including reporting requirements. The CMS includes a Complaints Register, in accordance with NSW CoA B8, which will record the details of all complaints relating to the M12 Central package, 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.

The TfNSW managed community information line will receive all complaints. TfNSW will arrange for distribution of the complaint to the relevant part of the overall Project for response. Where a complaint is applicable to M12 Central package it will be managed by Seymour Whyte. Seymour Whyte will assist TfNSW as required in determining the appropriate respondent.

All complaints relevant to the M12 Central package will be recorded in the Complaints Register within 24 hours. The Complaints Register will be provided to the ER on the day complaints are received, unless no complaints are received for a particular reporting period in which case no reporting is required. The Complaints Register will be provided to the Planning Secretary on request in accordance with NSW CoA B9.

If investigation identifies construction works or activities being undertaken as the likely source of the complaint, Seymour Whyte 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, Seymour Whyte will undertake the monitoring:

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

The complainant will be advised of the results of the investigation of their complaint and any proposed remedial action as relevant. See Section 5.5 of the CEMP for more details.

8.5 Standard management measures

Table 8-1 outlines actions that can be applied to manage the potential for noise and vibration to impact on sensitive receivers near the works with reference to the CNVG, the ICNG and in accordance with the Infrastructure Approval. These standard mitigation measures apply to all works and will be implemented as appropriate.

Table 8-1: Standard management measures to reduce construction noise and vibration

Action required	Applies to	Details
Implementation of any project specific mitigation measures required	Airborne noise Ground-borne noise & vibration	In addition to the measures set out in this table, any project specific mitigation measures identified in the EIA documentation (e.g. REF, submissions or representations report) or approval or licence conditions must be implemented.

Action required	Applies to	Details
Implement stakeholder consultation measures	Airborne noise Ground-borne noise & vibration	Periodic notification (monthly letterbox drop and website notification) detailing all upcoming construction activities delivered to sensitive receivers at least 7 days prior to commencement of relevant works. In addition to Periodic Notification, the following strategies may be adopted on a case-by-case basis: • Project Specific Website • Project Infoline • Construction Response Line • Email Distribution List • Web-based Surveys • Social Media • Community and Stakeholder Meetings and • Community Based Forums (if required by approval conditions).
Register of noise and vibration sensitive receivers	Airborne noise Ground-borne noise & vibration	A register of most affected noise and vibration sensitive receivers (NVSRs) would be kept on site. The register would include the following details for each NVSR: • Address of receiver • Category of receiver (e.g. Residential, Commercial etc.) • Contact name and phone number. The register may be included as part of the Project's Community Liaison Plan or similar document and maintained in accordance with the requirements of this plan.
Construction hours and scheduling	Airborne noise Ground-borne noise & vibration	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating noise with special audible characteristics and/or vibration levels should be scheduled during less sensitive time periods.
Construction respite period	Ground-borne noise & vibration Airborne noise	Noise with special audible characteristics and vibration generating activities (including jack and rock hammering, sheet and pile driving, rock breaking and vibratory rolling) may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block. 'Continuous' includes any period during which there is less than a 1 hour respite between ceasing and recommencing any of the work. No more than two consecutive nights of noise with special audible characteristics and/or vibration generating work may be undertaken in the same NCA over any 7-day period, unless otherwise approved by the relevant authority.

Action required	Applies to	Details
Site inductions	Airborne noise Ground-borne noise & vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: • All relevant project specific and standard noise and vibration mitigation measures • Relevant licence and approval conditions • Permissible hours of work • Any limitations on noise generating activities with special audible characteristics • Location of nearest sensitive receivers • Construction employee parking areas • Designated loading/unloading areas and procedures • Site opening/closing times (including deliveries) • Environmental incident procedures.
Behavioural practices	Airborne noise	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors. No excessive revving of plant and vehicle engines. Controlled release of compressed air.
Monitoring	Airborne noise Ground-borne noise & vibration	A noise monitoring program should be carried out for the duration of works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Attended vibration measurements	Ground-borne vibration	Attended vibration measurements shall be undertaken at all buildings within 25 m of vibration generating activities when these activities commence to confirm that vibration levels are within the acceptable range to prevent cosmetic building damage.
Update Construction Environmental Management Plans	Airborne noise Ground-borne noise & vibration	The CEMP must be regularly updated to account for changes in noise and vibration management issues and strategies.
Building condition surveys	Vibration Blasting	Undertake building dilapidation surveys on all buildings located within the buffer zone prior to major project construction activities with the potential to cause property damage.

Table 8-2 outlines the standard mitigation measures that should be applied “at the source” i.e. directly applied to plant and equipment to reduce noise and/or vibration from the work site.

Table 8-2: Standard source mitigation measures to reduce construction noise and vibration

Action required	Applies to	Details
Plan worksites and activities to minimise noise and vibration	Airborne noise Ground-borne vibration	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Equipment selection	Airborne noise Ground-borne noise & vibration	Use quieter and less vibration emitting construction methods where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits.
Maximum noise levels	Airborne-noise	The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the allowable noise levels.
Rental plant and equipment	Airborne-noise	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the allowable noise levels.
Use and siting of plant	Airborne-noise	Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be avoided. The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers.
Non-tonal reversing alarms	Airborne noise	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work, including delivery vehicles. RFI 383 dispensation to permit plant with tonal alarm approved with the following conditions: •No more than 5 separate plant across the project have tonal alarms •Should a complaint relating to the use of tonal alarms be raised, then the plant would be removed from the area that the complaint was raised. •Equipment with tonal alarms would only be used during the standard construction hours and Tonal Alarms (beepers) are not to be used during night works. •All SWC plant will be fitted with quackers

Action required	Applies to	Details
Minimise disturbance arising from delivery of goods to construction sites	Airborne noise	Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. Select site access points and roads as far as possible away from sensitive receivers. Dedicated loading/unloading areas to be shielded if close to sensitive receivers. Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible.
Construction Related Traffic	Airborne noise	Schedule and route vehicle movements away from sensitive receivers and during less sensitive times. Limit the speed of vehicles and avoid the use of engine compression brakes. Maximise on-site storage capacity to reduce the need for truck movements during sensitive times.
Silencers on Mobile Plant	Airborne noise	Where possible reduce noise from mobile plant through additional fittings including: Residential grade mufflers Damped hammers such as “City” Model Rammer Hammers Air Parking brake engagement is silenced.
Prefabrication of materials off-site	Airborne noise	Where practicable, pre-fabricate and/or prepare materials off-site to reduce noise with special audible characteristics occurring on site. Materials can then be delivered to site for installation.
Engine compression brakes	Airborne noise	Limit the use of engine compression brakes at night and in residential areas. Ensure vehicles are fitted with a maintained original equipment manufacturer exhaust silencer or a silencer that complies with the National Transport Commission’s ‘In-service test procedure’ and standard.

8.6 Management and mitigation 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 8-3: Noise and vibration management and mitigation measures

ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
NV1	All employees, contractors and subcontractors are to receive an induction prior to commencing work on the M12 Central package. 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	ESR	Best practice	Induction records
NV2	Training on noise and vibration requirements from this Plan will be provided to relevant construction personnel and subcontractors, as part of toolboxes and targeted training.	Prior to Construction Construction	ESR	G36 Best practice	Training records Toolbox talk sign on sheets
NV3	Minimise community noise disturbance, including avoiding: • Swearing or unnecessary shouting or loud stereos / radios • Dropping of materials from height, throwing of metal items and slamming of doors • Compression braking where possible.	Construction	Construction Manager Site Supervisors ESR All staff	G36 Best practice	Induction Toolbox talks Site inspection records
NV4	No blasting will be undertaken.	Construction	Construction Manager	NSW CoA E49	Site inspection records

ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
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 the specific activities occurring.	Prior to construction	ESR	REMM NV03	Noise screening assessment NVIS
NV6	A Construction Noise and Vibration Monitoring Program will be developed and implemented.	Prior to construction	ESR	NSW CoA C11(a) NSW CoA C14	Appendix B Monitoring reports
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	ESR (or delegate)	REMM NV04	Monitoring reports
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 Manager ESR Site supervisors	REMM NV04	Monitoring reports Site inspection records
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	ESR (or delegate)	REMM NV10	Monitoring reports Site inspection records
NV10	All construction plant and equipment used on the site will be operated in a proper and efficient manner.	Construction	Plant Manager Site supervisors	G36	Plant inspection records Site inspection records

ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
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 Manager Plant Manager Site supervisors ESR	G36	Plant inspection records
NV12	All construction plant and equipment used on Site must be fitted with properly maintained noise suppression devices including reversing 'quackers' (in place of tonal reversing alarms) in accordance with the manufacturer's specifications. RFI 383 dispensation to permit plant with tonal alarm approved with the following conditions: •No more than 5 separate plant across the project have tonal alarms •Should a complaint relating to the use of tonal alarms be raised, then the plant would be removed from the area that the complaint was raised. •Equipment with tonal alarms would only be used during the standard construction hours and Tonal Alarms (beepers) are not to be used during night works. •All SWC plant will be fitted with quackers	Construction	Plant Manager Site supervisors	G36	Site inspection records Toolbox talk records
NV13	Plant and machinery will be throttled down or shut down plant if being used intermittently, and switched off when it is not in use for more than 15 minutes. Outside normal working hours construction vehicles must not be parked with idling engines.	Construction	Site supervisors	G36	Induction records Pre-start briefing

ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
NV14	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	Site supervisors ESR	Best practice	Site inspection records EWMS
NV15	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	Site supervisors ESR	Best practice	Site inspection records EWMS
NV16	Construction vehicle movements (both on / offsite) will be managed to minimise noise impacts including where feasible (but not be limited to): • Establishing and using internal haul routes, or existing major roads where this is not feasible • Restricting heavy vehicle movements to approved standard 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 / Construction	Construction Manager Site supervisors ESR	REMM NV12	Site inspections Toolbox talks Construction TGSs
NV17	Seymour Whyte to inform TfNSW of the M12 Central package construction schedule on a progressive basis (e.g. monthly) to allow TfNSW to, where reasonable and feasible, offer receivers (identified as requiring at-property treatment for operational noise) treatment before construction activities begin that are likely to impact them.	Prior to Construction	Construction Manager Site supervisors ESR	REMM NV05	Project programme

ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
NV18	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 Manager ESR	REMM NV03	SEMP Noise assessments Consultation records
NV19	Appropriate safe working distances will be implemented to avoid impacts on structures and sensitive receivers during activities that generate vibrations.	Construction	Site supervisors ESR	REMM NV06 REMM NV08	Site inspection records
NV20	The use of alternatives to vibration generating equipment will be considered where vibration impacts are predicted.	Construction	Construction Manager Site supervisors ESR	REMM NV07	Construction documentation
NV21	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.	Construction	Construction Manager Site supervisors ESR	REMM NV08	EWMS Monitoring reports
NV22	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 on a monthly basis for the duration of the potential exceedances.	Construction	ESR Community Relations Manager	NSW CoA E41	Consultation records

ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
NV23	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 addition, vibration monitoring must be undertaken during construction for relevant remaining Fleurs Radio Telescope structures. 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 Manager Site engineers ESR	NSW CoA E42 G36	EWMS NVIS Monitoring results Construction documentation
NV24	Advice from a heritage specialist will be implemented on methods and locations for installing equipment used for vibration, movement and noise monitoring at heritage-listed structures prior to installing such equipment.	Construction	ESR	NSW CoA E43 G36	Heritage specialist advice
NV25	Advice from a suitably qualified and experienced built heritage specialist will be obtained and implemented before conducting at-property treatment on heritage items.	Construction	TfNSW	NSW CoA E44	Heritage specialist advice
NV26	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 engineer or building surveyor will complete a Pre-Construction Survey of surface and sub-surface structures and other relevant assets identified at risk from vibration (where the offer is accepted). Pre-Construction Surveys and the CNVMP will be provided to TfNSW at least 30 working days prior to the commencement of pile driving, excavation by hammering or ripping, dynamic compaction, demolition operations, or any other activity which may cause damage through vibration.	Prior to construction in relevant locations	ESR Property Manager	NSW CoA E76 REMM NV09 G36	Pre-Construction Survey Report

ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
NV27	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 engineer or building surveyor. 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.	Post construction in relevant locations	ESR Property Manager	NSW CoA E77	Post-Construction Survey Report
NV28	Surveys will be carried out to confirm the existing condition of the Jemena high pressure gas pipelines to determine appropriate vibration criteria. A vibration criterion of a peak particle velocity (PPV) will be determined in consultation with the relevant utility/service providers.	Prior to construction	Construction Manager	REMM NV10	Consultation records Construction documentation
NV29	The following structures have the potential to be within the safe working distances for sensitive structures (Group 3 from DIN 4150): • Item 2: Fleurs Radio Telescope Site • 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	ESR	REMM NV11	EWMS Monitoring reports
NV30	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	Community Relations Manager ESR	NSW CoA E56	Consultation records NVIS

ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
NV31	Measures to minimise and manage construction fatigue will be investigated through the planning of construction staging.	Prior to construction	Construction Manager	REMM NV02	Construction documentation including Work Packs, EWMS, NVIS and CSEP
NV32	Work, including those by third-parties, will be coordinated to ensure respite periods are provided.	Construction	Construction Manager ESR Site engineers	NSW CoA E45	Consultation records
NV33	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, in consultation with TfNSW. The offers of other reasonable arrangements will be implemented at no cost to the affected institution.	Construction	Construction Manager Site engineers Community Relations Manager ESR	NSW CoA E39 G36	Construction documentation Consultation records
NV34	Construction works will be scheduled in consultation with managers of other nearby 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, including Seymour Whyte will be carried out throughout construction.	Construction	Construction Manager Interface Manager Community Relations Manager ESR	REMM NV13 CoA E45	Consultation records Construction documentation Interface meeting minutes
NV35	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	ESR	NSW CoA E40	NVIS

ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
NV36	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	ESR	NSW CoA E48 G36	Site inspections records
NV37	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; (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.	Construction	Community Relations Manager ESR	NSW CoA E46	Consultation records
NV38	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	Community Relations Manager ESR	NSW CoA E47	Consultation records
NV39	Select the smallest rock hammers capable of efficiently completing the work, where feasible and reasonable.	Construction	Construction Manager Site supervisors	Best practice	Site inspections records

ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
NV40	Boundary screening will be erected around all ancillary facilities that are adjacent to sensitive receivers.	Construction	Construction Manager Site engineers	NSW CoA A21	SEMP Site inspections records
NV41	Installing hoarding to a height of 2.4m around site facilities to minimise noise and visual impacts on adjacent sensitive receivers, unless there is modelling which shows the acoustic benefit is not warranted and agreement is received from affected residents, business operators and landowners. The installation of hoarding must occur as soon as site establishment work at the site facilities are completed and before undertaking any works which are required to be conducted at the facility.	Construction	Construction Manager Site engineers	G36	SEMP Site inspections records
NV42	Planning construction plant and equipment location and movement to minimise impact on receivers (i.e. haulage routes, speed limits, parking locations, static noise sources, delivery hours and loading and unloading) and ensure staff are fully informed.	Construction	Construction Manager Site engineers	G36	SEMP Site inspections records
NV43	Earthworks will comply with the requirements of TfNSW QA Specification R44 for vibration unless overridden by other more stringent requirements set out in G36.	Construction	Construction Manager Site engineers	R44	Construction documentation Site inspections records

ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
NV44	To minimise construction fatigue in the community, the following measures will be implemented: • Ensure TfNSW Community Relations team and Seymour Whyte Community Relations team are provided with relevant background information in relation to project program / schedule and are kept up to date with any interactions with the community • Show empathy and understanding during interactions with the community • Liaise with other projects in the area to understand impacts and any cumulative impacts from adjacent projects.	Construction	All construction personnel	OCS	Consultation manager Complaints management system

8.7 Additional noise and vibration mitigation measures

In instances where noise levels are still predicted to exceed the NML at receivers, after the application of all reasonable and feasible mitigation and management measures (see Section 8.6), the CNVG directs that consideration should be given implementing the additional mitigation measures (see Appendix C of the CNVG for more detail) including:

- Notification (letterbox drop or equivalent) detailing work activities, time periods of which these will occur, expected levels of noise, impacts and mitigation measures. Notification of residents and businesses to be carried out not less than 5 calendar days and not more than 14 calendar days before those works are to be undertaken
- Specific notifications (SN), which provide additional information when relevant and informative to more highly affected receivers than covered in general letterbox drops
- Phone calls (PC), which detail relevant information to identified/affected stakeholders and provide personalised contact, tailored advice and the opportunity to comment on the proposed work
- Individual briefings (IB), which inform stakeholders about the impacts of high noise activities and mitigation measures, and provide personalised contact, tailored advice and the opportunity to comment on the proposed work
- Respite offers (RO), should be considered made where there are high noise and vibration generating activities near receivers to provide residents with respite from an ongoing impact
- Respite period 1 (R1), where out-of-hours construction noise in OOHW Period 1 is generally limited to no more than two consecutive evenings, and a maximum of three evenings per week and 10 evenings per month
- Respite period 2 (R2), where night-time construction noise in OOHW Period 2 is generally limited to two consecutive nights, and a maximum of three nights per week and 10 nights per month
- Duration respite (DR), which is where the work duration, number of evenings or nights is increased so that the work activity can be completed more quickly
- Alternative accommodation (AA)
- Tailored mitigation measure/s to individual circumstances (where engagement with affected stakeholder/s and/or resident/s has identified the need)
- Verification, including measurement of the background noise level and construction noise.

The additional mitigation measures required will be determined based on the time period works are being undertaken and the level of exceedance. Table 8-4 (extracted Table C.1 of the CNVG) details the triggers for additional mitigation measures for air-borne noise.

Note in instances where there are many receivers above the NML it may not be practical to discuss the work activity with every receiver as recommended above. Instead the community should be proactively engaged so they have an incentive to participate in discussion. Support from the community may be demonstrated from surveys, online feedback, contact phone numbers and community events.

In Section 7, Table 7-2 to Table 7-6 provide detail of the predicted construction noise exceedances against the NML for each works period. These will be refined as part of the development of NVIS including determining for specific sensitive receivers which additional noise and vibration mitigation measures are applicable.

Table 8-4: Triggers for additional mitigation measures – airborne noise (CNVG)

Perception	Predicted airborne $L_{Ae1(15min)}$ noise level receiver		Additional mitigation measures type	Mitigation levels
	dB(A) above RBL	dB(A) above NML		
All hours				
75 dB(A) or greater			N, V, PC, RO	HA
Standard Hours: Mon – Fri (7am – 6pm), Sat (8am – 6pm), Sun/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 (6pm – 10pm), Sat (7am – 8am & 6pm – 10pm), Sun/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
Highly intrusive	> 30	> 25	AA, V, IB, N, PC, SN, R2, DR	NML+25

Notes:

N – Notification

SN – Specific Notification

V – Verification

IB – Individual Briefings

RO – Respite Offer

R1 – Respite Period 1

R2 – Respite Period 2

DR – Duration respite

PC – Phone calls

AA – Alternative Accommodation

8.8 Light spill

The M12 Central package must be constructed and operated with the objective of minimising light spillage to surrounding properties. All lighting associated with the construction and operation of the CSSI must be consistent with the requirements of *Australian Standard 4282-2019 Control of the obtrusive effects of outdoor lighting*, relevant Australian Standards in the series AS/NZ 1158 – Lighting for Roads and Public Spaces, and the National Airports Safeguarding Framework (NASF) Guideline E: *Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports*.

- Temporary and permanent lighting will be designed and implemented with consideration of:
    - The need to orientate lighting to minimise light spill and glare impacts on nearby receivers
    - The need to minimise vandalism and maintenance requirements
    - Requirements of the National Airports Safeguarding Framework (NASF) (National Airports Safeguarding Advisory Group, n.d.) for operational lighting
    - Opportunities to implement sustainability initiatives in design such as energy efficient or solar lighting.

Additionally, mitigation measures must be provided to manage residual night lighting impacts to protect properties adjoining or adjacent to the CSSI, in consultation with affected landowners. These will include:

- Installing lighting equipment in work areas will be with a view to minimised disturbance to local residents
- Using deflection screens or fixtures on lights if required
- Only lighting the works areas required to be lit
- Lights should be kept low in intensity and close to the ground where possible
- Installing operational lighting infrastructure in accordance with the relevant TfNSW design drawings and standards
- Directing lighting away from vegetated areas where practicable and selecting lights with little or no blue in them (such as orange, red or amber coloured lights) which reduces skyglow and to which wildlife are generally less sensitive.

The M12 Central package Sustainability Management Plan includes a process for monitoring compliance with the requirements for managing light spill including a program of inspections during construction following establishment of site compounds, first time use of temporary night lighting in a new location and in response to light spill complaints.

9 Compliance management

9.1 Roles and responsibilities

The organisational structure for the M12 Central package and overall roles and responsibilities are outlined in Section 5.1 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Section 8 of this Plan. The Seymour Whyte Community Relations Manager, in conjunction with TfNSW, will be responsible for ensuring that notification and consultation has occurred with community stakeholders on the likely impacts of OOHW activities, in accordance with the CoA, OCS, CSEP and the CNVMP.

9.2 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 the OCNVMP, this CNVMP and all protocols, procedures and monitoring programs prepared under CNVMPs relevant to the M12 Central package
- Relevant legislation, regulations and EPL conditions (where applicable)
- Incident response, management and reporting
- Location of sensitive receivers
- Hours of work for construction and high noise impact works
- The process for seeking approval for out of hours works, including consultation
- Noise management measures during night works
- Proper and efficient use and maintenance of plant and equipment
- 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 be provided to staff with a key role in noise and vibration management (including those undertaking noise or vibration monitoring) or those carrying out an activity with a high risk of environmental impact. Site personnel will undergo refresher training at 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 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 provided in Section 5.3 of the CEMP.

9.3 Monitoring and inspections

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

Noise and vibration monitoring will also occur routinely for the duration of the M12 Central package, in accordance with the Construction Noise and Vibration Monitoring Program, which is detailed in Appendix B. The Construction Noise and Vibration Monitoring Program details when monitoring will be undertaken, as well as the representative locations adjacent to the construction works where noise and vibration monitoring will be undertaken.

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.

Monitored noise and vibration levels will be analysed against the predictions made in the relevant noise and vibration assessments. Where monitored noise levels are found to be above modelling predictions or vibration goals are exceeded, the following actions will be undertaken:

- Cease the noise and/or vibration generating source which causes the exceeded predictions
- Confirm the monitored levels are not being impacted by other (non-Project related) noise or vibration sources
- Confirm if the exceedance is due to an uncharacteristically loud piece of equipment
- Identify if the equipment can be swapped out for another piece of equipment or alternative equipment or plant, or if additional mitigation can be included in the site design
- Confirm that the modelling reflects the actual activity being undertaken
- Implement other feasible and reasonable measures which may include reducing plant size, modifying time of works, changing operational settings (such as turning off the vibratory function of the machine), and utilising alternative construction methodology or a combination of these
- Review work practices to ensure compliance with the management levels set out in this CNVMP
- Ensure that the learnings from the above are fed back into the noise modelling assessment process for fine-tuning
- Continue work where impacts can be reduced
- Communicate lessons learnt to relevant personnel.

Where vibration generating activities have the potential to be within the minimum safe working distances as identified in Table 5-9, the following actions will be undertaken:

- Undertake a site-specific assessment of the proposed vibration generating activities, including reviewing the particular item of plant and local geotechnical conditions to refine the minimum safe working distance
- If it is determined based on the site-specific assessment that the refined minimum safe working distances are to be exceeded, alternative, lower impact construction methodologies will be considered, i.e. a different construction method with lower source vibration levels, such as reducing the size of the plant item; using a roller without the mechanical vibration setting; using a ripper in-place of an excavator with hammer etc
- Where alternatives cannot be implemented, attended vibration monitoring is to be undertaken before and during the vibration generating activity and any sensitive receivers notified in advance. Vibration monitoring shall provide real-time notification of exceedances of levels approaching cosmetic damage criteria
- Where attended vibration monitoring is not feasible, due to extended periods of vibration intensive works, a permanent vibration monitoring system would be installed to warn plant operators (via flashing light, SMS alert, etc.) that there is potential cosmetic damage to buildings and structures
- Where vibration generating activities have the potential to impact on heritage items the more stringent criteria in Section 5.6.4 will be applied
- Should vibration monitoring identify exceedances of the preferred values for vibration, works will cease, and work practices reviewed, in consultation with TfNSW ESM (or delegate) to ensure compliance with the management levels set out in this CNVMP.

The minimum working distances for cosmetic damage must be complied with at all times, unless otherwise approved by the TfNSW ESM (or delegate) or the EPL, as relevant. In relation to human comfort (response), the minimum working distances in Table 5-9 relate to continuous vibration. For most construction activities, vibration emissions are intermittent in nature and for this reason, higher vibration levels, occurring over shorter periods are allowed (refer to OEH's Assessing Vibration: a technical guideline).

Further details of monitoring requirements for the M12 Central package are presented in Section 7.2 of the CEMP.

9.4 Hold Points and Witness Points

Hold Points and Witness Points relevant to this Plan are outlined in Table 9-1.

Table 9-1: Hold Points and Witness Points applicable to this Plan

TfNSW QA spec	Clause	Type	Description	Plan reference
G36	4.6	Hold point	At least 30 working days prior to the commencement of pile driving, excavation by hammering or ripping, dynamic compaction, demolition operations, or any other activity which may cause damage through vibration, provide TfNSW with a copy of the Pre-Constriction Condition Survey reports and the CNVMP.	Section 8.6, NV26 Section 9.6

9.5 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of the noise and vibration management measures, compliance with this CNVMP, CoA, EPL and other relevant approvals, licenses, and guidelines. Audit requirements are detailed in Section 7.4 of the CEMP.

9.6 Reporting

Reporting requirements relevant to the management of noise and vibration are identified in Table 9-2. Further information on the reporting of noise and vibration monitoring results is presented in the Monitoring Program (Appendix B of this Plan). Requirements and responsibilities for reporting are further described in Section 7.5 of the CEMP.

Accurate records will be maintained substantiating all construction activities associated with the M12 Central package or relevant to the conditions of approval, including measures taken to implement this CNVMP. Records will be made available to DPHI and DCCEEW upon request, within the timeframe nominated in the request.

Table 9-2: Reporting requirements relevant to this Plan

Item	Frequency	Standards	External reporting	Responsibility
Monthly Environmental Report	Monthly, by the 10th day of the following month	Reporting as required by TfNSW G36 Specification, Section 3.11.1.2, including: all environmental monitoring data including but not limited to.. ..noise and vibration.	TfNSW	ESR
Incident and non-compliance reports	At each occurrence	Reporting of incidents and non-compliances in accordance with CoA, EPL, PIRMP, G36 and the TfNSW Environmental Incident Classification and Reporting Procedure as outlined in the CEMP	Appropriate authority dependant on nature of the incident (e.g. EPA, DPE) (see Section 6 of CEMP)	ESR
Complaint register	Daily (ER, EPA) as received DPE as requested	Reporting of complaints, in accordance with the CoA, EPL and OCS, through the complaints register, to the ER and EPA for any complaints received (on the day they are received). Communication, notification and complaints handling requirements regarding noise and vibration matters will be managed through the Complaints Management System and the OCS. Receipt of a complaint(s) in relation to noise and/or vibration is a trigger to carry out monitoring of noise and vibration.	ER (NSW CoA A35) EPA (in accordance with EPL conditions) DPE (as requested by the Secretary)	ESR Community Relations Manager
Construction Noise and Vibration Monitoring Reports	Every quarter from the commencement of construction	Reporting as detailed in the Construction Noise and Vibration Monitoring Program (Appendix B)	Submit to TfNSW who will issue to DPE and relevant government agencies (G36)	ESR
Noise and Vibration Impact Statements	At each occurrence	Reporting as detailed Section 8.1.	ER (NSW CoA E40) TfNSW (as per G36) DPE (upon request as per NSW CoA E40)	ESR

Item	Frequency	Standards	External reporting	Responsibility
Pre-construction Condition Surveys	Once (pre-construction)	A factual report of the pre-construction structural condition of each building identified as being at risk of damage (see Table 8-3, NV26). A comprehensive report will be prepared by a suitably qualified professional before the relevant works begin and will comprise a written and photographic condition. Relevant works includes pile driving, excavation by hammering or ripping, dynamic compaction, demolition operations, or any other activity which may cause damage through vibration.	Report must be provided to TfNSW at least 30 working days prior to, and the owner of the item(s) surveyed no later than one (1) month prior to, the commencement of all other potentially impacting works.	ESR Property Manager
Post-construction Condition Surveys	Once (post-construction)	A factual report of the post-construction structural condition of each building identified as being at risk of damage (see Table 8-3, NV27)	Report 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.	ESR Property Manager
NSW CoA E47 Consultation reports	Quarterly basis (or more frequently if required)	A report containing the outcomes of the community consultation, the identified respite periods and the scheduling of the likely out-of-hours work in accordance with NSW CoA E47.	Report must be provided to the ER, EPA and the Planning Secretary for information prior to work scheduled for the subject period being undertaken.	ESR Communication and Engagement Manager

Item	Frequency	Standards	External reporting	Responsibility
Emergency Works Report	At each occurrence	On becoming aware of the need for Emergency Works in accordance with EPL condition L5.4 and NSW CoA E36(a)(ii), TfNSW, the ER, the EPA and the Planning Secretary must be notified, including the reasons for such emergency work. The EPA's Environment Line must be notified as soon as practicable	TfNSW, ER (NSW CoA E36). EPA (in accordance with EPL conditions). DPE (as requested by the Secretary)	ESR

10 Review and improvement

10.1 Continuous improvement

Continuous improvement of this Plan, the Construction Noise and Vibration Monitoring Program (Appendix B) and the OOHW Procedure (Appendix C) 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 non-conformances and deficiencies
- Respond quickly to nonconformities
- 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 ESR is responsible for ensuring stage-specific environmental risks are identified and included in the M12 Central package risk register and appropriate mitigation measures implemented throughout the construction, as part of the continuous improvement process. The process for ongoing risk identification and management during construction is outlined in Section 4.1.2 of the CEMP.

10.2 CNVMP update and amendment

The processes described in Section 7.7 of the CEMP may result in the need to update or revise this Plan. This will occur as needed. Any revisions to this Plan and other Sub-plans will be in accordance with the process outlined in Section 1.12 of the CEMP.

A copy of the updated Plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure.

A copy of the updated CNVMP and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure (refer to Section 7.6.2 of the CEMP).

Construction Noise and Vibration Management Sub-plan

Appendix A – Secondary CoA, Secondary REMMs and TfNSW QA specifications

M12 Motorway - Central

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Appendix A – Secondary CoA, Secondary REMMs and TfNSW QA Specifications

Secondary requirements that are related, but not specific to, the development of this Plan are outlined in this appendix. Cross references are provided to indicate where the requirements are addressed in this Plan or other Project management documents. This includes:

- Secondary NSW Conditions of Approval (CoA) which are listed in Table A1
- Secondary Revised Environmental Management Measures (REMMs) which are listed in Table A2
- Relevant requirements of the TfNSW QA Specifications which are listed in Table A3.

Table A1: Secondary NSW CoA

CoA No.	Condition Requirements	CNVMP Reference
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.	OCNVMP Section 1.6
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;	Section 7.2.2

CoA No.	Condition Requirements	CNVMP Reference
	(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 (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 (ii) manage the risks identified in the risk analysis undertaken in subsection (c) 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 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**.*	Section 7.2.2

CoA No.	Condition Requirements	CNVMP Reference
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 ofmatters such as compliance with the *Interim Construction Noise Guideline* (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 theterms of this approval.	Section 7.2.2
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 8.6, NV41
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. 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.	OCS CSEP CEMP Section 8.3
B2	The **Communication Strategy** must: (a) identify people, organisations, councils and agencies to be consulted during the design andWork 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	OCS CSEP CEMP Section 8.3

CoA No.	Condition Requirements	CNVMP Reference
	concern to the relevant community(ies); and (f) set out procedures and mechanis–s - (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.	
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; (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.	CEMP Section 8.4
B7	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.	CEMP Section 8.3

CoA No.	Condition Requirements	CNVMP Reference
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 3 Section 6.3 Section 8 Appendix A
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 1.5.1
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; (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.	Section 9.3 Appendix B

CoA No.	Condition Requirements	CNVMP Reference
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 9.6 Section 6.2 of Appendix B
E81	The Proponent must have regard 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) when constructing the CSSI.	N/A – Not triggered by M12 Central package
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.	N/A – Not triggered by M12 Central package

Table A2: Secondary REMMs

ID	Measure/Requirement	Timing	Document Reference
NV02	Measures to minimise and manage construction fatigue are to be investigated through the planning of construction staging.	Prior to and during construction	Section 8.6, NV31 and NV44
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 8.1 Section 8.6, NV5, NV18
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 8.6, NV7 Section 9.3 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 8.6, NV17
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 5.6 Section 8.6, NV19

ID	Measure/Requirement	Timing	Document Reference
NV07	The use of alternatives to vibration generating equipment will be considered where vibration impacts are predicted.	During construction	Section 8.6, NV20
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.	During construction	Section 5.6 Section 8.6, NV19, NV21 Section 9.3 Appendix B
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. A comprehensive report will be prepared by a suitably qualified professional before the relevant works begin and will comprise a written and photographic condition.	Prior to construction	Section 8.6, NV26 Section 9.6 Appendix C
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. 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.	Construction	N/A – Not triggered by M12 Central package Section 5.6.5 Section 8.6, NV28 Appendix B

ID	Measure/Requirement	Timing	Document Reference
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 8.6, NV29 Appendix B Note Items 1, 4 and 6 not triggered for M12 Central
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	CTTMP (site specific construction TGSs) Section 8.6, NV16
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	Prior to and during construction	Section 6.3 Section 8.6, NV34

ID	Measure/Requirement	Timing	Document Reference
	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.		
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 Section 8.3 OCS CSEP
LVIA07	Temporary and permanent lighting will be designed and implemented with consideration of:	Detailed design, prior to construction and during construction	Section 8.8
	The need to orientate lighting to minimise light spill and glare impacts on nearby receivers		
	The need to minimise vandalism and maintenance requirements		
	Requirements of the National Airports Safeguarding Framework (NASF) (National Airports Safeguarding Advisory Group, n.d.) for operational lighting		
	Opportunities to implement sustainability initiatives in design such as energy efficient or solar lighting		

Table A3: TfNSW QA specifications

Specification	Measure/requirement	CNVMP Reference
G36, Section 4.6, Noise Control	Prepare and implement a Construction Noise Management Sub-Plan and Monitoring Program as part of the CEMP, to minimise the impact of noise from your operations on adjacent properties and Sensitive Receivers. The Construction Noise Management Sub-Plan must include proposed environmental control measures for all significant noise generating activities.	This Plan
	The mitigation strategies in the Construction Noise Management Sub-Plan and Monitoring Program must include implementation of all reasonably practicable measures to minimise noise including: (i) Identification of all Sensitive Receivers that are potentially exposed to construction noise and details of construction noise criteria at Sensitive Receivers;	Section 4.1
	(ii) Restrictions on the hours of construction activity where goals may be exceeded;	Section 5.3
	(iii) Developing construction programming to minimise impacts - this may include time and duration restrictions and respite periods;	Section 5.3 Section 8.6, NV34
	(iv) Adopting noise mitigation measures consistent with TfNSW publication “Construction Noise and Vibration Guideline” and “Interim Construction Noise Guideline (DECC, 2009)” including but not limited to mobile acoustic hoarding near Sensitive Receivers;	Section 3.1.2 Section 8
	(v) Notifying residents and businesses of future works and expected levels of noise 5 working days in advance of the works occurring;	Section 8.7
	(vi) Investigating all noise complaints (including undertaking noise level measurements) and implementing appropriate mitigation measures where practicable to minimise further impacts;	Section 8.4
	(vii) Responding quickly to nonconformities;	Sections 9.3, 9.6, 10.1

Specification	Measure/requirement	CNVMP Reference
G36, Section 4.6, Noise Control	(viii) Planning construction plant and equipment location and movement to minimise impact on receivers (i.e. haulage routes, speed limits, parking locations, static noise sources, delivery hours and loading and unloading) and ensure staff are fully informed;	Section 8.6, NV42
	(ix) Monitoring construction noise at appropriate intervals and in response to complaints to ensure effectiveness of mitigation measures;	Sections 8.4, 9.3 Appendix B
	(x) Do not timetable noise generating works in the vicinity of potentially-affected community, religious, educational institutions and noise and vibration-sensitive businesses within sensitive periods unless other Principal approved arrangements to the affected institutions are made;	Section 8.6, NV33
	(xi) Installing hoarding to a height of 2.4m around site facilities to minimise noise and visual impacts on adjacent Sensitive Receivers, unless there is modelling which shows the acoustic benefit is not warranted and agreement is received from affected residents, business operators and landowners. The installation of hoarding must occur as soon as site establishment work at the site facilities are completed and before undertaking any works which are required to be conducted at the facility;	Section 8.6, NV41
	(xii) Progressively installing operational noise mitigation measures to minimise construction noise impacts;	Section 7.2.4
	(xiii) Avoiding compression braking where possible;	Section 8.6, NV3
	(xiv) Throttling down or shutting down plant used intermittently. Outside normal working hours construction vehicles must not be parked with idling engines;	Section 8.6, NV13
	(xv) An Out-of-Hours work and approval procedure consistent with EPL, State and Federal CoA requirements and Clause 3.6;	Appendix B

Specification	Measure/requirement	CNVMP Reference
G36, Section 4.6, Noise Control	(xvi) A procedure to identify and consult with receivers identified as being subject to levels that exceed the Highly Noise Affected criteria (included in the Environmental Assessment Documentation and relevant Guidelines) with the objective of determining appropriate hours of respite unless an agreement is reached with those receivers;	Section 8.2.3
	(xvii) Crushing and grinding works must only be undertaken during Working Hours unless otherwise approved by the Planning Secretary and allowed for in accordance with Clause 3.6; and	Section 8.6, NV36
	(xviii) Measures to minimise cumulative construction impacts and construction fatigue.	Section 8.6, NV31 and NV44
	Refer to the requirements of the EPA publication “Interim Construction Noise Guideline” and TfNSW publication “Construction Noise and Vibration Guideline”, when considering the environmental control measures and practices to be included in the Construction Noise Management Sub-Plan.	Section 3.1.2 Section 8
	Where Works are proposed to be undertaken outside of normal working hours, comply with the requirements of Clause 3.7.2 and Clause 4.6.1.	Sections 5.3, 8.2 Appendix C
	All construction plant and equipment used on Site must be, in addition to other requirements: (a) fitted with properly maintained noise suppression devices including reversing ‘quackers’ in accordance with the manufacturer’s specifications;	Section 8.6, NV12
	(b) maintained in an efficient condition;	Section 8.6, NV11
	(c) operated in a proper and efficient manner.	Section 8.6, NV10

Specification	Measure/requirement	CNVMP Reference
G36, Section 4.6.1, Highly Noise Intensive Works	Unless permitted by an EPL or Out-of-Hours Work Protocol (where an EPL does not apply), Highly Noise Intensive Works that result in an exceedance of the applicable Noise Management Level (as defined in the Interim Construction Noise Guideline (DECC, 2009)) 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 hours, with a minimum cessation of work of not less than one hour. 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 Highly Noise Intensive Works.	Section 5.3
G36, Section 4.6.2 Noise and Vibration Impact Statements	Prepare Noise and Vibration Impact Statements (NVIS) for any work that may exceed the noise management levels (as defined in the Interim Construction Noise Guideline (DECC, 2009)) and vibration criteria (established in accordance with guidelines and standards specified in Clause 4.7) at any residence outside the normal working hours identified in Clause 3.6, 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 8.1
G36, Section 4.6.3, - Out of Hours Work – Mitigation	Mitigation measures such as temporary alternative accommodation or other agreed mitigation measures, must be offered/ made available to residents affected by work outside normal working hours (including where utility works are being undertaken for the project 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 nights over a seven day rolling period.	Section 8.6, NV37 Section 8.7

Specification	Measure/requirement	CNVMP 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 project.	
G36, Section 4.6.4, Out of Hours Work – Community Consultation on Respite	In order to undertake work outside normal working hours identify appropriate respite periods for the 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 work outside normal working hours; (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 noise management levels (as defined in the Interim Construction Noise Guidelines) and vibration criteria (defined in accordance with guidelines and standards specified in Clause 4.7) (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 work outside normal working hours must be provided to the ER, EPA and the Planning Secretary for information prior to work scheduled for the subject period being undertaken. Respite periods can be any combination of days or hours where out-of-hours work would not be more than 5 dB(A) above the rating background noise level at any residence.	Section 8.2.3
G36, Section 4.7 Ground Vibration	Implement all measures to prevent damage to adjacent public utilities, structures and buildings resulting from construction vibration.	Section 5 Section 8
	Comply with the requirements of Specification TfNSW R44 for vibration unless overridden by other more stringent requirements set out in this Specification.	Section 8.6, NV44

Specification	Measure/requirement	CNVMP Reference
G36, Section 4.7 Ground Vibration	Blasting is not permitted under this Contract.	Section 8.6, NV4
	Meet the requirements of EPA “Environmental Noise Management Assessing Vibration: A Technical Guideline”. Where the requirements are likely to be exceeded, manage the impacts in consultation with, and in accordance with, the requirements stipulated by EPA.	Section 3.1.2
	To avoid structural damage, carry out construction activities in accordance with the following requirements: 1. for structural damage to heritage structures, the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration – Part 3 Effects of vibration on structures; 2. for damage to other buildings and/or structures, the vibration limits set out in the British Standard BS 7385-2:1993 – Evaluation and measurement of vibration in buildings Part 2— Guide for measurement of vibration and evaluation of their effects on buildings (and referenced in Australian Standard 2187.2 – 2006 Explosives – Storage and use – Use of explosives); and 3. for human exposure, the acceptable vibration values set out in Assessing Vibration: A Technical Guideline (Department of Environment and Conservation, 2006).	Sections 5.5, 5.6
	Where there is a risk that vibration activities may cause damage to nearby structures (including sub-surface structures) and buildings or if these are located within the distance from the construction activity specified in Annexure G36/E, undertake a building condition inspection and prepare a Building Condition Inspection Report for every property or structure likely to be affected.	Section 8.6, NV26 Section 9.6
	The Building Condition Inspection Reports must contain photographs of the inspected properties and include details of the inspectors’ qualification and expertise as an engineer or building surveyor, together with a list of any identified defects, where relevant. The reports must be submitted to the owner of each property and to the Principal within three weeks of completing the surveys, and no later than one month prior to commencement of WUC (pre-construction condition survey) and no later than three months following the completion of WUC. Similar Reports must also be completed for WaterNSW assets and include the condition of the affected part of WaterNSW assets.	Section 8.6, NV26 Section 9.6

Specification	Measure/requirement	CNVMP Reference
G36, Section 4.7 Ground Vibration	Where Building Condition Inspection Reports have been undertaken prior to WUC, subsequent post-construction inspections 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 inspections must be documented in a Post-Construction Building Condition Inspection Report for each item inspected. The Post-construction Condition Survey Reports must be provided to the owner of the structures/assets inspected, and no later than four months following the completion of construction activities that have the potential to impact on the structure / asset.	Section 8.6, NV27 Section 9.6
	Prepare, as part of the CEMP, a Construction Vibration Management Sub-Plan and Monitoring Program as part of the CEMP, that describes the environmental controls to be implemented during construction to minimise the impact of vibration on adjacent properties and residents.	The Plan
	The Construction Vibration Management Sub-Plan or mitigation strategies must detail how construction vibration will be managed for various plant items working adjacent to buildings. Keep records as evidence of compliance with these construction vibration restrictions.	This Plan
	Your Construction Vibration Management Sub-Plan mitigation must contain the following measures at a minimum: (a) Vibration goals at Sensitive Receivers (including but not limited to WaterNSW and other utility assets);	Sections 5.5, 5.6
	(b) Restrictions on the hours of construction activity where goals may be exceeded;	Section 5.3
	(c) Developing construction programming to minimise impacts - this may include time and duration restrictions and respite periods;	Section 5.3 Section 8.6, NV34

Specification	Measure/requirement	CNVMP Reference
G36, Section 4.7 Ground Vibration	(d) Adopting vibration mitigation measures consistent with TfNSW publication “Construction Noise and Vibration Guideline” including; (i) Process to determine minimum working distances/ work methods to prevent cosmetic damage to Heritage Items, in consultation with a heritage specialist. (ii) Process to alter construction methodology should vibration testing and monitoring show the preferred values are likely to be exceeded.	Section 5.6 Section 8 and 9
	(e) Adopting vibration mitigation measures for WaterNSW assets consistent with the requirements of German Standard DIN 4150-3:1999 Structural Vibration Part 3: Effects of vibration in structures including; (i) Process to determine minimum working distances/ work methods to prevent damage (ii) Process to alter construction methodology should vibration testing and monitoring show the preferred values are likely to be exceeded.	Section 5.6
	(f) Adopting a process to ensure that vibration from construction activities does not exceed the vibration limits set out in the British Standard BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from ground borne vibration.	Section 5.6
	(g) Notifying residents and businesses of future works and expected levels of vibration 5 working days in advance of the works occurring. If there is potential for cosmetic damage vibration criteria exceedances to occur more than once or extend over a 24 hour period, provide affected owners and occupiers with a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances, unless otherwise agreed with the owner or occupier;	Section 8.6, NV22 Section 8.7
	(h) Investigating all vibration complaints and implementing appropriate mitigation measures where practicable to minimise further impacts;	Section 8.4
	(i) Responding quickly to non-compliances; and	Sections 9.3, 9.6, 10.1

Specification	Measure/requirement	CNVMP Reference
G36, Section 4.7 Ground Vibration	(j) Conducting vibration testing before and during vibration generating activities that have the potential to impact Sensitive Receivers or Heritage Items, to identify minimum working distances/ work methods to prevent damage (including cosmetic). Seek advice from a heritage specialist on methods and locations for installing equipment used for vibration, movement and noise monitoring at heritage-listed structures. In the event that the vibration testing and monitoring shows that the limiting values for vibration are likely to be, or have been exceeded, review the construction methodology and, if necessary, implement additional mitigation measures.	Section 5.6.4 Section 8.6, NV23, NV24
	Undertake monitoring of vibration at appropriate intervals and in response to complaints.	Sections 8.4, 9.3 Appendix B
	Where blasting is not required or allowed for the Work Under the Contract, vibration mitigation and management measures may be incorporated into a combined Construction Noise and Vibration Management Sub-Plan.	The Plan
	You are liable for any accident or damage to any property, person, or thing resulting from vibration from construction activity and responsible for rectification work prior to completion of WUC.	Noted.

Appendix B – Construction Noise and Vibration Monitoring Program

Construction Noise and Vibration Management Sub-plan

Appendix B – Construction Noise & Vibration Monitoring Program

M12 Motorway – Central

January 2025

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Document control

File Name	Construction Noise and Vibration Monitoring Program
Title	M12 Central CEMP: Appendix B2 Construction Noise and Vibration Management Sub-plan Appendix B - Construction Noise and Vibration Monitoring Program
Document Number (Teambinder)	M12CCO-SYW-ALL-EN-PLN-000005

Approval and authorisation

Plan reviewed by:	Plan reviewed by:
[redacted] Seymour Whyte Environmental Site Representative	[redacted] Seymour Whyte Project Manager
18/01/2025	18/01/2025
	

Revision history

Revision	Date	Description
A	18/02/2022	First draft for TfNSW review
B	29/04/2022	Updated in response to TfNSW review
C	27/06/2022	Updated in response to TfNSW review
D	27/07/2022	Updated in response to TfNSW and ER review
E	26/05/2023	Updated to reflect changes in accordance with RFI 383 and OCEMP
F	18/07/2023	Updated in response to OCEMP update
G	18/01/2025	Updated in response to OCEMP update

Contents

Figures

Tables

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
CEMP	Construction Environmental Management Plan
CNVG	Construction Noise and Vibration Guideline (Roads and Maritime 2016)
CNVMP	Construction Noise and Vibration Management Sub-plan
CoA	Condition of Approval
DAWE	Former Commonwealth Department of Agriculture, Water and the Environment (now Department of Climate Change, Energy, Environment and Water)
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)
DPIE	Former Department of Planning, Industry and Environment (now Department of Planning and Environment)
EES	Former Environment, Energy and Science
EHG	Environment and Heritage Group (a part of NSW DCCEEW)
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 – Minor Consistency Assessment for Proposed Change to the M12 Motorway Project (M12 Central) • Arcadis (rSeptember, 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 at 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 – East Site 48, 50 and 51 Boundary Changes Minor Consistency Assessment • Arcadis (January, 2024) M12 Motorway – Minor Consistency Assessment M12 Central Water Tower Access Road The documents that comprise the EPBC referral:

Abbreviation	Expanded Text
	• 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 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	Environmental Site Representative (Seymour Whyte)
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.
Monitoring Program, this	Construction Noise and Vibration Monitoring Program
NCA	Noise Catchment Areas
NML	Noise Management Level
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water (Formerly NSW DPE)
OCEMP	Overarching Construction Environmental Management Plan
OCNVMP	Overarching Construction Noise and Vibration Management Sub-plan
OOHW	Out-of-Hours Works – work completed outside of approved standard hours
POEO Act	NSW *Protection of the Environment Operations Act 1997*
Project, the	The CSSI as approved by the Minister for Planning and Public Spaces on the 23 April 2021 (SSI 9364)
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

Abbreviation	Expanded Text
TfNSW	Transport for New South Wales
VDV	Vibration dose value
WSIA	Western Sydney International Airport

1 Introduction

1.1 Context

This Construction Noise and Vibration Monitoring Program (Monitoring Program) is an appendix of the Construction Noise and Vibration Management Sub-plan (CNVMP) which forms part of the Construction Environmental Management Plan (CEMP) for the M12 Motorway – Central package.

This Monitoring Program has been prepared under the Overarching Construction Environmental Management Plan (OCEMP) and relevant sub-plans developed for M12 Motorway (the Project), to address the requirements of the Minister's Conditions of Approval (CoA), Revised Environmental Management Measures (REMMs) listed in Environmental Impact Statement (EIS), Submissions Report, Amendment Report, Amendment Report Submissions Report (ARSR), ARSR Amendment Report, all applicable legislation, and Transport for New South Wales (TfNSW) specifications.

1.2 Background

1.2.1 M12 Motorway (the Project)

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 Western Sydney International Airport (WSIA). The Project will be delivered in a number of stages (or work packages) as described in the Project Staging Report. A detailed Project description is provided in Section 2.1 of the CEMP.

1.2.2 M12 Central

Seymour Whyte has been engaged to deliver the M12 Motorway – Central package. Construction of the M12 Central package involves building 7.5 km section of motorway from west of Badgerys Creek to the Water Tower Access Road within Western Sydney Parklands. A detailed description of the M12 Central package is provided in Section 2.3 of the CEMP.

1.3 Scope of the program

The scope of this Monitoring Program is to describe how the environmental noise and vibration impacts from construction will be monitored during the delivery of the M12 Central package. This Monitoring Program has been prepared under and consistent with the OCEMP, and in particular the Overarching Noise and Vibration Monitoring Program which forms part of the Overarching Construction Noise and Vibration Management Sub-Plan (OCNVMP), considering relevant sensitive receivers and construction activities. In the preparation and ongoing implementation of this Plan, SMART (Specific, Measurable, Achievable, Realistic and Timely) principles are to be considered and applied.

This Monitoring Program has been developed to describe how environmental noise and vibration will be monitored in the immediate vicinity of construction sites. Operational monitoring measures do not fall within the scope and therefore are not included in this Monitoring Program. A copy of this Monitoring Program will be kept on the premises for the duration of construction.

1.4 Environmental Management Systems overview

The Environmental Management System (EMS) for the M12 Central package is described in Section 3 of the CEMP. To achieve the intended environmental performance outcomes, Seymour Whyte have established, implemented, maintained and continually improved an EMS in accordance with the requirements of ISO14001:2015. The Seymour Whyte EMS, which is consistent with overarching EMS described in the OCEMP, will be adopted as the guiding environmental management framework for the M12 Central package.

This Monitoring Program forms part of the environmental management framework for the M12 Central package, as described in Section 3.3 of the CEMP. This Monitoring Program has been developed consistent with the OCEMP including the Overarching Construction Noise and Vibration Monitoring Program, the CNVMP and the EMS.

1.5 Approval, review and modification

The Overarching Construction Noise and Vibration Monitoring Program 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 C11(a). This Monitoring Program will be reviewed by the TfNSW ESM (or delegate) and the ER to confirm it is consistent with, and incorporates, all relevant elements of the approved OCEMP, and in particular the Overarching Noise and Vibration Monitoring Program which forms part of the Overarching Construction Noise and Vibration Management Sub-Plan (OCNVMP), and other requirements, prior to submission to the Planning Secretary and Environment Protection Authority (EPA) for information. Construction of the M12 Central package will not commence until the CNVMP, and this Monitoring Program are endorsed by the ER and provided to the Planning Secretary and EPA for information.

The Monitoring Program will be implemented for the duration of construction and for any longer period set out in this Monitoring Program or as specified by the Planning Secretary, whichever is the greater. This Monitoring Program will be reviewed every six months by the Seymour Whyte Environmental Site Representative (ESR) in consultation with TfNSW. Minor amendments to this Monitoring Program may be provided to the ER for acceptance.

The ESR is responsible for the development of this Monitoring Program. Any amendments to the Monitoring Program will be documented in subsequent revisions of this Monitoring Program. All review comments provided by the ER on the Monitoring Program must be addressed to the satisfaction of the ER. A copy of the updated Monitoring Program and changes will be distributed to all relevant stakeholders in accordance with the document control procedure outlined in the CEMP. Site personnel with responsibilities relevant to noise and vibration monitoring will be informed of amendments to the Monitoring Program with appropriate training provided, as relevant.

1.6 Purpose and objectives

The purpose of this Monitoring Program is to describe how, where and when Seymour Whyte will monitor for environmental noise and vibration during construction of the M12 Central package. The key objective of this Monitoring Program is to ensure that noise and vibration impacts to sensitive receivers and the local community from construction of the M12 Central package are minimised.

See Section 2.2 of the CNVMP for further details objectives of this Monitoring Program. See Section 2.3 of the CNVMP for specific targets for the management of noise and vibration impacts during the delivery of the M12 Central package.

2 Environmental requirements

Section 3 of the CNVMP provides details of the relevant legislation, guidelines, protocols, standards and TfNSW QA specifications applicable to this Monitoring Program.

2.1 Conditions of Approval

The NSW CoA relevant to this Monitoring Program is provided 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 2-1: NSW CoA relevant to the preparation of this Monitoring Program

CoA no.	Condition	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	OCNVMP (Appendix B) Section 1.6 of the CNVMP
C13	Each Construction Monitoring Program must provide:	-
	(a) details of baseline data available;	Section 3.2
	(b) details of baseline data to be obtained and when;	Section 3.2
	(c) details of all monitoring of the CSSI to be undertaken;	Sections 3.5 and 3.6
	(d) the parameters of the CSSI to be monitored;	Section 3.5 Section 3.6
	(e) the frequency of monitoring to be undertaken;	Section 3.5 Table 3-10 Section 3.6 Table 3-11
	(f) the location of monitoring;	Section 3.7
	(g) the reporting of monitoring results and analysis of results against the relevant criteria;	Section 4.3
	(h) details of methods that will be used to analyse monitoring data;	Section 4.2
	(i) procedures to identify and implement additional mitigation measures where results of monitoring indicate unsatisfactory CSSI impacts;	Section 4.2
	(j) a consideration of SMART principles;	Section 1.3
	(k) any consultation to be undertaken in relation to the monitoring programs; and	Section 1.6 of the CNVMP
	(l) any specific requirements as required by Condition C14.	Section 3.5 Section 3.6

CoA no.	Condition	Reference
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;	Section 3.5 Section 3.6
	(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 3.5
	(c) method and frequency for reporting monitoring results; and	Section 4.3
	(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 4.2
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 1.5
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 4.3
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) 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 3

CoA no.	Condition	Reference
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 3.6 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-listed structures.	Section 3.5.1 Section 3.6.1 Section 8 of the CNVMP

2.2 Revised Environmental Management Measures

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

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

REMM	Requirement	Reference
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 3.5 Section 3.6 Section 4.2 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 3.6 Section 8 of the CNVMP

REMM	Requirement	Reference
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. 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.	Section 3.6 Section 4.2 Section 8 of the CNVMP
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.	Section 3.6 Section 4.2 Section 8 of the CNVMP

3 Noise and Vibration Monitoring

3.1 Noise and vibration sensitive receivers

The noise and vibration assessment in the EIS, Submissions Report, Amendment Report, ARSR and ARSR Amendment Report (collectively Environmental Assessment Documentation), identified and considered potential construction noise and vibration impacts for each habitable dwelling or park along the Project alignment, including the M12 Central package, and within 1,200 metres either side of the new or existing road centre line.

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. The alignment of the M12 Central package is mainly through semi-rural properties with few residences.

Noise Catchment Areas (NCAs), that reflect comparable land uses, nature and types of receivers within an area, were established as part of the EIS noise assessment as detailed in Table 3-1.

Table 3-1: Noise Catchment Areas for the M12 Central package

NCA	Minimum distance[1]	Description
NCA03	440 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 construction footprint on Mamre Road.
NCA04	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 Street. It is primarily residential with the nearest receivers located adjacent the construction footprint to the north of Elizabeth Drive.
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
NCA06	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.
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 construction footprint.

Notes: (1) Approx. minimum horizontal distance in metres from the construction footprint to the nearest sensitive receiver

The identified noise sensitive receivers and the NCAs relevant for the M12 Central package are shown in Figure 3-1. The predicted noise contours for the 'bulk earthworks – peak impact scenario' have been included as a reference for predicted construction noise impacts. Project wide predicted construction noise contours, including M12 Central package, 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.

3.2 Existing environment (baseline data)

A summary of the background noise and vibration levels is provided in Section 4 of the CNVMP. As referenced in the Amendment Report, it is considered that the baseline data obtained during the development of the EIS is sufficiently comprehensive and that no further baseline data is required to be collected. Notwithstanding, attended noise monitoring will be carried out prior to the commencement of construction to verify the background noise environment.

Unattended noise surveys in and around the M12 Central package were conducted at five 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 M12 Central package. The monitoring equipment was generally located at receivers which will have line-of-sight to the M12 Central package or to existing major roads.

The rating background level (RBL) has been used to determine an 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 for the M12 Central package is provided in Table 3-2.

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

ID	Background noise (RBL) Periods based on extended construction hours[1]					Average noise level LA_{eq} (period) based on Road Noise Policy[2]	
	Morning shoulder	Day	Evening	Evening Shoulder	Night	Day 15 hour	Night 9 hour
L02	47	36	39	41	34	46	45
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

Notes:

(1) 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

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

Prior to the commencement of construction, Seymour Whyte will carry out additional attended baseline monitoring to verify the background noise environment data recorded during the development of the Environmental Assessment Documentation. 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.

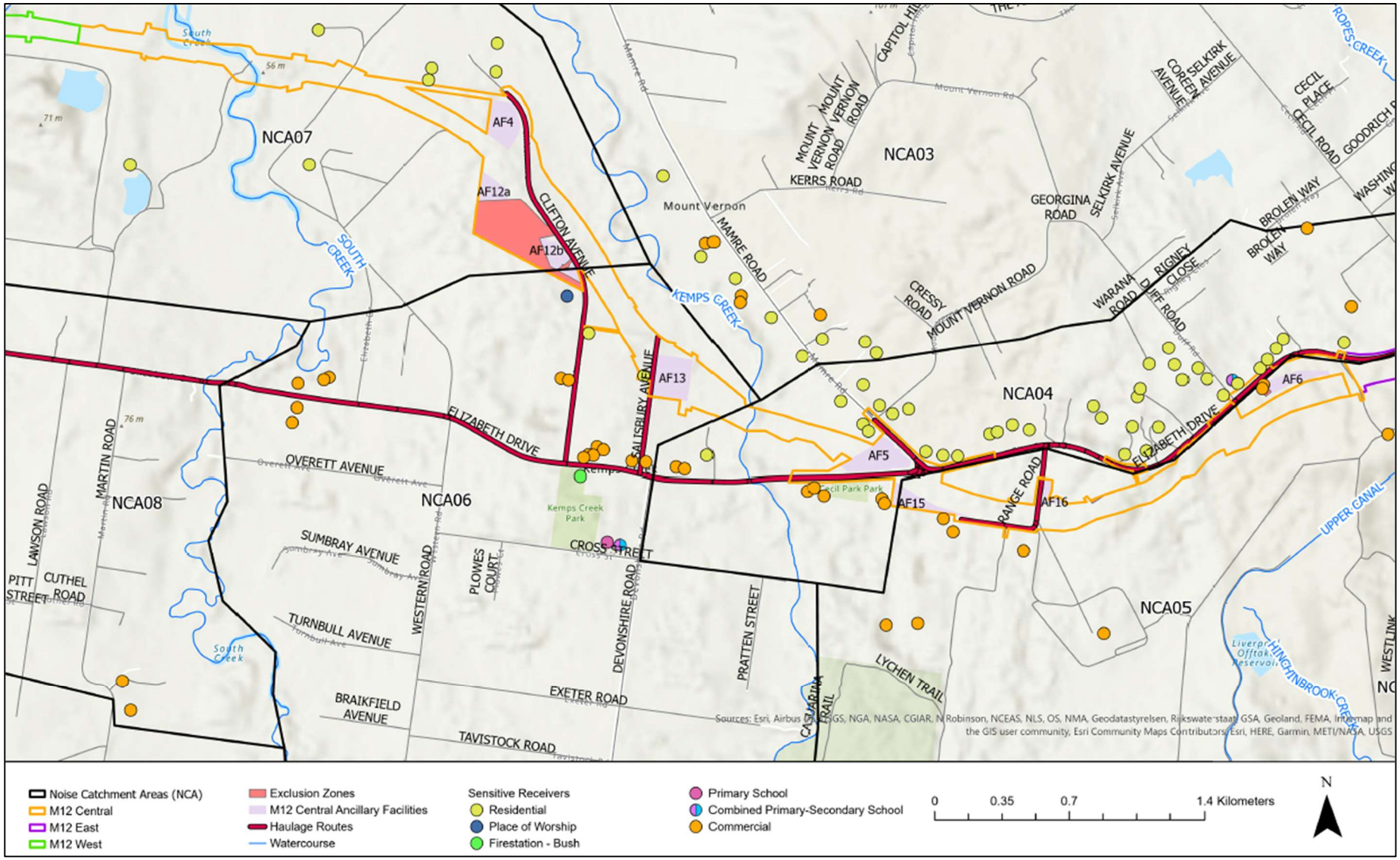
NCA07
NCA08
NCA06
NCA04
NCA03
NCA05
AF4
AF12a
AF12b
AF13
AF5
AF6
AF15
AF16
CLIFTON AVENUE
SOUTH CREEK
KEMPS CREEK
MAMRE ROAD
Mount Vernon
KERRS ROAD
MOUNT VERNON ROAD
CRESSY ROAD
GEORGINA ROAD
SELKIRK AVENUE
CECIL PLACE
CECIL ROAD
GOODRICH
BROLEN WAY
WARANA ROAD
RIGNEY CLOSE
ELIZABETH DRIVE
SALISBURY AVENUE
OVERETT AVENUE
MARTIN ROAD
LAWSON ROAD
SUMBRAY AVENUE
WESTERN ROAD
PLOWES COURT
CROSS STREET
DEVONSHIRE ROAD
PRATTEN STREET
RANGE ROAD
PITT STREET
CUTHEL ROAD
TURNBULL AVENUE
BRAIKFIELD AVENUE
EXETER ROAD
TAVISTOCK ROAD
LYCHEN TRAIL
CASUARINA TRAIL
UPPER CANAL
HINCHINBROOK CREEK
ROPES CREEK
Kemps Creek Park
Cecil Park Park
Noise Catchment Areas (NCA)
M12 Central
M12 East
M12 West
Exclusion Zones
M12 Central Ancillary Facilities
Haulage Routes
Watercourse
Sensitive Receivers
Residential
Place of Worship
Firestation - Bush
Primary School
Combined Primary-Secondary School
Commercial
0
0.35
0.7
1.4 Kilometers
N

Figure 3-1: Location of noise catchment areas and noise and vibration sensitive receivers

3.3 Construction noise criteria

Based on the recorded RBLs, the noise criteria, including NMLs adopted for the M12 Central package is set out in Table 3-3 for residential receivers and in Table 3-4 for non-residential receivers.

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

NCA	Monitoring location	NML LAeq(15min) (dBA)						Sleep disturbance screening criteria (RBL + 15 dB)
		Standard construction (RBL + 10dB)	Out of hours (RBL + 5dB)					
		Day[1]	Morning shoulder[2]	Day[3]	Evening[4]	Evening shoulder[5]	Night[6]	
NCA03	L05	49	44	44	44	44	40	50
NCA04	L03	64	59	59	53	53	42	52
NCA05	L02	46	41	41	41	41	39	49
NCA06	L05	49	44	44	44	44	40	50

NCA	Monitoring location	NML LAeq(15min) (dBA)						
		Standard construction (RBL + 10dB)	Out of hours (RBL + 5dB)					Sleep disturbance screening criteria (RBL + 15 dB)
		Day[1]	Morning shoulder[2]	Day[3]	Evening[4]	Evening shoulder[5]	Night[6]	
NCA07	L06	44	39	39	39	39	36	46

Notes:

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

(2) 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

(3) 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

(4) 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

(5) 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

(6) 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

Table 3-4: 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		
Passive recreation areas[1]	External	60
Active recreation areas[2]	External	65
Industrial premises	External	75

Land use	Noise assessment location	NML (LAeq,15min)[3]
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

3.4 Construction vibration criteria

3.4.1 Disturbance to building occupants

Maximum and preferred values for continuous and impulsive vibration for the M12 Central package are outlined in Table 3-5.

Table 3-5: Continuous and impulsive vibration acceleration (m/s^2) 1-80 Hz

Location	Assessment period[1]	Preferred Values		Maximum Values	
		z axis	x and y axis	z axis	x and y axis
Continuous vibration					
Critical areas[2]	Day or night-time	0.0050	0.0036	0.010	0.0072
Residences	Daytime	0.010	0.0071	0.020	0.014
	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
Residences	Daytime	0.30	0.21	0.60	0.42
	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

(2) Such as hospital operating theatres or precision laboratories.

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 M12 Central package are defined in Table 3-6.

Table 3-6: 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

(2) E.g. Operating theatres, precision laboratories and other areas where vibration sensitive activities may occur.

3.4.2 Structural damage to buildings

Cosmetic damage vibration limits for buildings and associated minimum working distances are identified in the CNVG, British Standard *BS7385 Part 2-1993 Evaluation and measurement for vibration in buildings Part 2* (BS 7385) and German Standard *DIN 4150: Part 3-2016 Structural vibration – Effects of vibration on structures* (DIN 4150-3) (DIN, 1999).

The cosmetic damage levels set by BS7385 are considered 'safe limits' up to which no damage due to vibration effects has been observed for particular building types. Table 3-7 sets out the recommended vibration limits from BS7385 for transient vibration to ensure that there is minimal risk of cosmetic damage to residential, commercial and industrial buildings, and is frequency dependent and specific to particular categories of structure.

Table 3-7: Transient vibration guide values for minimal risk of cosmetic damage

Line	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and Above
1	Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures. Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Notes: Based on BS 7385-2

3.4.3 General vibration screening criterion

The guide values in Table 3-7 relate predominantly to transient vibration which does not give rise to resonant responses in structures and low-rise buildings. Where the dynamic loading caused by continuous vibration may give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values may need to be reduced by up to 50%. Rock breaking / hammering activities are considered to have the potential to cause dynamic loading in some structures (e.g. residences) and it is therefore appropriate to reduce the transient values by 50%.

For construction activities involving intermittent vibration sources such as rock breakers, piling rigs, vibratory rollers and excavators, the predominant vibration energy occurs at frequencies greater than 4 Hz (and usually in the 10 Hz to 100 Hz range). On this basis, a conservative vibration damage screening level per receiver type is:

- Reinforced or framed structures: 25.0 mm/s
- Unreinforced or light framed structures: 7.5 mm/s.

At locations where the predicted and/or measured vibration levels are greater than shown above (peak component particle velocity) monitoring will be performed during construction. At these locations a more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure would be undertaken to determine the applicable safe vibration level.

3.4.4 Heritage buildings and items

Where structures are more sensitive such as heritage buildings and items, more stringent conditions may be applicable and will be considered on a case-by-case basis.

The 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 as shown in Table 3-8.

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

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

Notes:

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

3.4.5 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. Trigger alerts will be set where vibration monitoring in accordance with Jemena guidelines identifies vibration at 15mm/second. 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.

3.4.6 Safe working distances

Where vibration intensive plant such as rock breakers, piling rigs or vibratory rollers are used, vibration must be managed to minimise disturbance to building occupants and to avoid damage to buildings and other structures. Table 3-9 provides safe working distances as recommended by the CNVG for typical items of vibration intensive plant that must be complied with unless otherwise approved by the TfNSW ESM.

Table 3-9: Safe working distances for vibration intensive plant (CNVG)

Plant item	Rating/description	Safe working distance		
		Cosmetic damage (BS 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)	5 m	14 m	15 m to 20 m
	<100 kN (typically 2-4 t)	6 m	16 m	20 m
	<200 kN (typically 4-6 t)	12 m	33 m	40 m
	<300 kN (typically 7-13 t)	15 m	41 m	100 m
	>300 kN (typically 13-18 t)	20 m	54 m	100 m
	>300 kN (> 18 t)	25 m	68 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 3-9 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.

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.

3.5 Noise monitoring methods

The noise monitoring procedure for the M12 Central package is provided in Table 3-10. Noise monitoring will be undertaken by Seymour Whyte environmental personnel who are appropriately trained in the measurement and assessment of construction noise and vibration and have working knowledge of the requirements of AS 2659.1 and this Monitoring Program.

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 ESR (or delegate) 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 3-10: Noise monitoring procedure

Monitoring details	Frequency	Test procedure
Attended noise surveys will be carried out to verify noise environment, RBLs and NMLs	Prior to the commencement of construction	• Surveys to be carried out at the five locations identified in the Environmental Assessment Documentation relevant to the M12 Central package • Monitoring equipment is to be located at receivers which would have line-of-sight to the M12 Central package works 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 • Following review and verification, the RBLs and NMLs will be confirmed and/or modified as necessary in consultation with TfNSW.

Monitoring details	Frequency	Test procedure
Attended monitoring will be carried out at the commencement of activities for which a NVIS has been prepared to confirm the actual noise	On the first occasion of activities for which a NVIS has been prepared	The 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 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 • 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 • 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, L_{10} and L_{90} 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 3.3 and predicted noise levels. Observations will also be reported including audibility of construction noise, other noise in the environment and any discernible construction activities contributing to the noise at the receiver.
Attended OOHW noise monitoring at sensitive receivers during evening, night and OOH (weekends/ public holidays)	As required during OOHW	
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	
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)	On each occasion works undertaken in accordance with NSW CoA E36(b)(i) are carried out	
Noise monitoring at non-sensitive receivers predicted to be impacted by moderate exceedances of the NML from work in standard hours	As required	
Spot checks of noise intensive plant where it is required to check the noise emission from the plant against manufacturer’s specifications	When a noise intensive piece of equipment commences works on site	The test procedure for construction plant will be guided by the stationary test procedures according to Australian Standard AS 2012.1. • Sound level meter configured for “Fast” time weighting and “A” frequency weighting

Monitoring details	Frequency	Test procedure
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 the wind speed at the test site exceeds 5 m/s.
Real time (unattended) monitoring	As required	Refer to Section 3.5.2
Validation monitoring	At least the first two nights of OOHW	For any works that are the subject of a community agreement under the EPL or OOHW Protocol 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.

3.5.1 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 3 of the CNVMP.

3.5.2 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 in isolation.

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

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.

3.6 Vibration monitoring methods

The vibration monitoring procedure for the M12 Central package is provided in Table 3-11. Seymour Whyte environmental personnel who are appropriately trained in the measurement and assessment of construction noise and vibration and have working knowledge of the requirements of *Environmental Noise Management - Assessing Vibration: a technical guideline* (DEC, 2006) and this Monitoring Program.

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 3-11: 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: • 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 • 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 • 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 values.
Where a complaint is received in relation to human exposure to vibration levels and monitoring is considered an appropriate response	As required	
Where a complaint is received in relation to suspected property damage due to vibration impacts and monitoring is considered an appropriate response	As required	
Where an activity may occur within safe working distances for cosmetic damage for no more than one day continuously	As required	
Where required for the purposes of refining Construction methods to reduce vibration levels	As required	
Where an activity may occur within safe working distances for cosmetic damage for a period of more than one day continuously	As required	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

Monitoring details	Frequency	Test procedure
		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 have the potential to impact on heritage items	As required	• Identify minimum working distances to prevent cosmetic damage • 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	As required	• 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 necessary, additional mitigation measures will be implemented.

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 Section 3.4.6. Details of site activity and equipment usage will be noted during monitoring.

3.6.1 Vibration monitoring equipment

All monitoring will be undertaken by competent personnel, suitability trained and experienced in undertaking vibration measurements. Vibration monitoring would be undertaken using an accelerometer which meets the requirements of BS 5228 Part 2:2009 and BS7385 Part 2:1993. All vibration monitoring equipment is to be calibrated at least once every two years by an ISO 17025 accredited laboratory that holds NATA or ILAC accreditation for completion of vibration calibrations. The monitoring system will also have a measurement frequency range down to 1 Hz.

All short-term vibration monitoring will be recorded over 15-minute sample intervals. The magnitude of vibration is to be recorded at a minimum rate of 10 samples per second. The following minimum range of vibration metrics will be stored in memory and reported:

- Vibration Dose Values (VDVs)
- Root-mean-square (rms) – maximums and statistical levels
- Peak-particle velocity (ppv) – maximums and statistical levels.
- In addition to measuring and reporting overall vibration, statistical vibration will also be measured and reported in third-octave band frequencies from 1Hz to 250Hz.

The following information will be recorded within the vibration monitoring record template:

- Date and time of measurements
- Type and model number of instrumentation
- Description of the time aspects of each measurement (i.e. sample times, measurement time intervals and time of day)
- Sketch map of area
- Measurement location details and number of measurements at each location
- Operation and load conditions of the vibrating plant under investigation
- Possible vibration influences from other sources (e.g. domestic vibrations, other mechanical plant, traffic, etc.).

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.

3.7 Noise and vibration monitoring locations

The locations of noise and vibration sensitive receivers are shown in Figure 3-1. Seymour Whyte 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 this Monitoring Program.

Noise monitoring locations will include representative sensitive receivers in each relevant NCA including at least one near field and one in a setback location. 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.

4 Compliance management

4.1 Roles, responsibility and training

The organisational structure for the M12 Central package and overall roles and responsibilities are outlined in Section 5.1 of the CEMP. Specific responsibilities for the implementation of environmental controls for noise and vibration are detailed in the CNVMP.

All personnel working on site will undergo a site induction and targeted training relating to noise and vibration management issues, as detailed in the CNVMP. All personnel involved in the implementation of this Monitoring Program will receive training in the correct use of the equipment, including field maintenance, use, storage and data analysis. The ESR is responsible for training and keeping records of trained staff.

4.2 Data analysis and management response

Noise and vibration monitoring results obtained during the Monitoring Program will be compared against the performance criteria described in Sections 3.3 and 3.4, and in Section 5 of the CNVMP. If an exceedance is identified, the ESR (or delegate) will co-ordinate a management review and the appropriate responses that are triggered. The review will assess:

- Construction activities occurring at the time, including specific equipment in comparison to that assessed as part of the noise assessment and/or relevant approvals
- If any High Noise Impact Works were occurring
- Determining possible causes for the exceedance(s)
- The implementation and effectiveness of Standard and Additional mitigation measures (Section 8 of the CNVMP) in place at the time of the exceedance
- Compliance with the NVIS as relevant
- Other (non-project) activities that may influence monitoring results (unrelated works or events such as meteorological conditions etc).

If the exceedance is determined to be attributable to M12 Central package, the event will be classified as a non-conformance, incident or reportable event as defined by the M12 Environment Incident Classification and Reporting Procedure (Appendix A7 of the CEMP). The exceedance will be reported to TfNSW (PM and ESM or delegate) and the ER within seven days and managed in accordance with the requirements of the CEMP (Section 7.3 and Appendix A7), with corrective and preventative actions to be identified and implemented. These actions may include advising relevant personnel of the problem, 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. Details of exceedances will be provided in the Monthly Environmental Reports.

Where actual noise levels are found to exceed the predicted worst-case levels, the source of excessive noise will be identified, and any additional feasible and reasonable measures will be implemented to 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.

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 QA specifications and the procedure for dealing with non-compliance with environmental management measures outlined in Section 7.3 of the CEMP. The ESR will 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 in consultation with TfNSW based on the level of risk or reoccurrence of the exceedance (e.g. a significant risk will require immediate action).

4.3 Reporting

All monitoring results are to be provided to TfNSW on request, or provide access to the website portal if “real-time” monitoring is utilised.

4.3.1 Monthly Environmental Report

A Monthly Environmental Report will be prepared for the duration of the M12 Central package for submission to the TfNSW ESR (or delegate) for review and to the ER for information.

Information to be detailed in the reports includes:

- Results summary and analysis of the environmental monitoring
- Review of monitoring data against relevant noise and vibration criteria, including NMLs
- Performance of this Monitoring Program
- Summary of any complaints received that are related to noise and vibration complaints.

Refer to Section 7.5 of the CEMP for further detail on environmental reporting.

4.3.2 Construction Monitoring Report – Noise and Vibration

A quarterly Construction Monitoring Report will be prepared for the duration of the M12 Central package, detailing the results of the noise and vibration monitoring undertaken in accordance with this Monitoring Program.

Construction Monitoring Reports will include, but not be limited to:

- 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
- Review of monitoring data against the nominated noise and vibration criteria
- Identification of exceedances of the nominated criteria and descriptions of the likely causes
- Details of any alterations/deviations from the Monitoring Program

- Summary of any complaints received regarding noise and vibration.

The Construction Monitoring Report will be submitted every six months to TfNSW, the ER, the EPA and the Planning Secretary for information until construction completion.

Accurate records of all noise and vibration monitoring activities will be maintained.

4.3.3 Reporting of monitoring following complaints

Where not using “real time” monitoring, the ESR (or delegate) will undertake attended compliance noise and vibration monitoring following the receipt of a complaint and report the results of the monitoring to TfNSW as soon as possible, but in any case in less than five (5) working days. Where noise and/ or vibration exceedances are detected, procedures are to be reviewed (as per Section 4.2) in order to identify means to minimise the impacts to residents.

5 Review and improvement

5.1 Continuous improvement

Continuous improvement of this Monitoring Program 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 noise and vibration 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 non-conformances 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 ESR is responsible for ensuring stage-specific environmental risks are identified and included in the M12 Central package risk register and appropriate mitigation measures implemented throughout the construction, as part of the continuous improvement process. The process for ongoing risk identification and management during construction is outlined in Section 4.1.2 of the CEMP.

5.2 Monitoring Program update and amendment

The processes described in Section 7.7 of the CEMP may result in the need to update or revise this Monitoring Program. This will occur as needed. Any revisions to this Monitoring Program will be in accordance with the process outlined in Section 1.12 of the CEMP.

A copy of the updated Monitoring Program and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure (refer to Section 7.6.2 of the CEMP).

Appendix C – Out of Hours Work Procedure

Appendix C

Out-of-Hours Work Procedure

M12 Motorway – Central

January 2025

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Document control

File Name	OOHW Procedure
Title	M12 Central CEMP: Appendix B2 Construction Noise and Vibration Management Sub-plan Appendix C – Out of Hours Work Procedure
Document Number (Teambinder)	M12CCO-SYW-ALL-EN-PLN-000005

Approval and authorisation

Plan reviewed by:	Plan reviewed by:
[redacted] Seymour Whyte Environmental Site Representative	[redacted] Seymour Whyte Project Manager
18/01/2025	18/01/2025
	

Revision history

Revision	Date	Description
A	18/02/2022	First draft for TfNSW review
B	29/04/2022	Updated in response to TfNSW review
C	27/06/2022	Updated in response to TfNSW review
D	27/06/2022	Updated in response to TfNSW and ER review
E	26/05/2023	Updated to reflect changes in accordance with RFI 383 and OCEMP
F	18/07/2023	Updated in response to OCEMP update
G	18/01/2025	Update in response to OCEMP update

Contents

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
Approved standard hours	Hours during which construction work is permitted by the NSW CoA
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
AVTG	Assessing Vibration – a technical guideline (DEC 2006)
CMS	Complaints Management System
CNVMP	Construction Noise and Vibration Management Plan
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 OCEMP, works approved under a Site Establishment Management Plan, demolition of acquired residential houses, structures and sheds, and works specified in Appendix B of the Infrastructure Approval 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' sub-contractors.
CSSI	Critical State Significant Infrastructure
DAWE	Former Commonwealth Department of the Water, Agriculture and Environment (now Department of Climate Change, Energy, Environment and Water)
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

Abbreviations	Expanded Text
DCCEEW	Commonwealth Department of Climate Change, Energy, Environment and Water
DEC	Former Department of Environment and Conservation (now Environment and Heritage Group (EHG) (a part of NSW DPE)
DECC	Former Commonwealth Department of Environment and Climate Change (now DCCEEW)
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)
DPIE	Former Department of Planning, Industry and Environment, now Department of Planning and Environment)
DR	Duration Respites
EES	Former Environmental, Energy and Science
EHG	Environment and Heritage Group (a part of NSW DPE)
EIS	Environmental Impact Statement
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) • Arcadis (rSeptember, 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 at 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 – East Site 48, 50 and 51 Boundary Changes Minor Consistency Assessment • Arcadis (January, 2024) M12 Motorway – Minor Consistency Assessment M12 Central Water Tower Access Road The documents that comprise the EPBC referral:

Abbreviations	Expanded Text
	• 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.
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	TfNSW Environment and Sustainability Manager
ESR	Environmental Site Representative (Seymour Whyte)
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.
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.
IB	Individual briefing
ICNG	Interim Construction Noise Guideline (DECC 2009)

Abbreviations	Expanded Text
Infrastructure Approval	Approval (SSI 9364) for carrying out of the M12 Project under Section 5.19 of the *Environmental Planning and Assessment Act 1979* 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
OCEMP	Overarching Construction Environmental Management Plan
OCNVMP	Overarching Construction Noise and Vibration Management Sub-plan
OCS	Overarching Communication Strategy
OEH	Office of Environment and Heritage, now EHG
OOH	Out-of-Hours
OOHW	Out-of-Hours Works – work completed outside of approved standard hours
Planning Secretary	Secretary of the NSW Department of Infrastructure, Planning and Environment, or delegate
Primary CoA/REMM	CoA/REMM that are specific to the development of this Plan
Project, the	The CSSI as approved by the Minister for Planning and Public Spaces on the 23 April 2021 (SSI 9364)
QA	Quality Assurance

Abbreviations	Expanded Text
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 TfNSW QA specification G1
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

1 Introduction

1.1 Context

This Out-Of-Hours Work (OOHW) Procedure is an appendix of the Construction Noise and Vibration Management Sub-plan (CNVMP) which forms part of the Construction Environmental Management Plan (CEMP) for the M12 Motorway – Central package.

This OOHW Procedure has been prepared under the Overarching Construction Environmental Management Plan (OCEMP) and relevant sub-plans developed for M12 Motorway (the Project), to address the requirements of the Minister's Conditions of Approval (CoA), Revised Environmental Management Measures (REMMs) listed in the Environmental Impact Statement (EIS), Submissions Report, Amendment Report, and Amendment Report Submissions Report (ARSR), ARSR Amendment Report, all applicable legislation, the Environment Protection Licence (EPL) issued for M12 Central package and Transport for New South Wales (TfNSW) specifications.

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 Sitesd 48, 50 and 51 Boundary Changes 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.

1.2 Background

1.2.1 M12 Motorway (the Project)

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. A detailed Project description is provided in Section 2.1 of the CEMP.

1.2.2 M12 Central

Seymour Whyte has been engaged to deliver the M12 Central package. Construction of the M12 Central package involves building 7.5 km of motorway from west of Badgerys Creek to the Water Tower Access Road within Western Sydney Parklands. A detailed description of the M12 Central package is provided in Section 2.3 of the CEMP.

1.3 Scope of the OOHW Procedure

This Out-Of-Hours Work (OOHW) Procedure has been developed to manage any work associated with construction of the M12 Central package that will be carried outside the standard construction hours, and subject to the Environment Protection Licence (No. 21596) (EPL). This Procedure describes how to ensure compliance with the EPL and has been developed under and consistent with TfNSW QA specification G1, and as relevant, the OCEMP, and in particular the OOHW Protocol which forms part of the Overarching Construction Noise and Vibration Management Sub-Plan (OCNVMP), considering relevant sensitive receivers and construction activities. For OOHW, not subject to an EPL, works will be undertaken consistent with the requirements of the OOHW Protocol which forms part of the OCNVMP.

This OOHW Procedure has been developed in accordance with the EPL and NSW CoA E36(c)(i), and is to be read in conjunction with the Construction Noise and Vibration Guideline (Roads and Maritime, 2016) (CNVG) and OOHW Protocol. This OOHW Procedure forms part of the

Construction Noise and Vibration Management Sub-Plan (CNVMP) for the M12 Central package, and has been prepared in consultation with the independent Environmental Representative (ER). A copy of this OOHW Procedure will be kept on the premises for the duration of construction.

1.4 Environmental Management Systems overview

This OOHW Procedure forms part of the environmental management framework for the M12 Central package, as described in Section 3.3 of the CEMP. This OOHW Procedure is to be used in conjunction with the CNVG , the CNVMP, Noise and Vibration Impact Statements (NVIS), and the EPL. These documents establish minimum requirements for managing noise and vibration impacts on the M12 Central package. All construction noise and vibration documentation including NVIS that discuss OOHW must be aligned and consistent with this OOHW Procedure.

1.4.1 TfNSW Construction Noise and Vibration Guideline

The M12 Central package will be implemented in accordance with the TfNSW Construction Noise and Vibration Guideline (Roads and Maritime, 2016) (CNVG). Relevant cross references to the CNVG occur through this document to avoid duplication.

The CNVG is available at: Construction noise and vibration guideline (nsw.gov.au)

Some discrepancies between the Infrastructure Approval (SSI 9364) and CNVG exist. This OOHW Procedure, which specifically aligns to the project-specific Conditions of Approval, takes precedence over the CNVG where inconsistencies occur.

All relevant Standard and Additional Mitigation Measures of the CNVG will apply to OOHW to minimise impacts to the local community and stakeholders, which are identified within Appendix A and Appendix B of the CNVG . Additional Mitigation Measures that specifically relate to OOHW and residual impacts are described in Section 7 of this OOHW Procedure.

1.4.2 Construction Noise and Vibration Management Plan

The CNVMP provides specific mitigation and management measures to minimise potential noise and vibration impacts during works outside of standard hours. The CNVMP includes a Noise and Vibration Monitoring Program which outlines how noise and vibration monitoring will be carried out, how the results of monitoring will be reported and procedures to identify and implement additional mitigation measures as necessary.

1.4.3 Noise and Vibration Impact Statement(s)

A Noise and Vibration Impact Statement (CNVIS) is a location and activity specific document that provides an assessment of the anticipated noise and vibration impacts of construction at sensitive receivers. In accordance with NSW CoA E40, a NVIS is to be prepared for any work that may exceed the noise management levels and vibration criteria specific in NSW CoA E38 (Section 5 of the CNVMP) at any residence outside the approved standard hours, or where receiver will be highly noise affected, i.e. noise levels above 75dB(A).

During development of an NVIS to support proposed works, consideration of the assessment steps provided in Sections 5, 6 and 7 of the CNVG , including the identification of all applicable mitigation measures such as those required by the NSW CoA, REMMMs, and the Standard and Additional Mitigation Measures outlined in Appendix A and B of the CNVG . The aim of this assessment is to minimise the impact of noise and vibration on sensitive receivers because of OOHW. It is noted that applied Standard and Additional Mitigation Measures may be modified as a result of community consultation outcomes and detailed in the OOHW approval request (see Section 8 for more details). 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.

1.4.4 Environment Protection Licence

An EPL is a regulatory approval issued to strategically control the localised, cumulative and acute impacts of pollution. The NSW Environment Protection Authority (EPA) is responsible for issuing EPLs for 'scheduled activities' under the *Protection of the Environment Operations (POEO) Act 1997* (NSW). An EPL has been obtained for the M12 Central package under Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act) for 'road construction'.

The process for approving OOHW outside of those already permitted in accordance with an EPL, is governed by the conditions of the EPL. For these types of OOHW to be approved, an application to vary the EPL is to be prepared and submitted to the EPA for approval. The Environmental Site Representative (ESR) is responsible for preparing the EPL variations and the application is to be in accordance with the CNVG and EPL requirements.

OOHW that are subject to an EPL are permitted in accordance with NSW CoA E36(c)(i) of the Infrastructure Approval, and therefore do not require approval by the Secretary.

1.5 Approval, review and modification

This OOHW Procedure will be reviewed by the TfNSW Environment and Sustainability Manager (ESM) (or delegate) and the ER to confirm it is generally consistent with, and incorporates, all relevant elements of the approved OCEMP and other requirements, prior to submission to the EPA. Works outside of the standard construction hours will not commence on the M12 Central package until this OOHW Procedure is approved by the ER and issued to the EPA. The OOHW Procedure will be implemented for the duration of construction.

Any amendments to the OOHW Procedure will be documented in subsequent revisions of this OOHW Procedure. A copy of the updated OOHW Procedure and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure outlined in the CEMP. Site personnel with responsibilities relevant to out of hours works will be informed of any amendments to the OOHW Procedure and training provided, where required.

2 Hours of work

2.1 Standard Hours of Works

In accordance with TfNSW QA specification G1, the contractual working days and nights of work 'standard construction hours' for the M12 Central package are between 7:00 am to 6:00 pm Monday to Friday inclusive but excluding public holidays and rostered days off.

In accordance with EPL condition L5.1 and NSW CoA E34, the 'approved standard hours' are:

- Monday to Friday: 7:00 am to 6:00 pm
- Saturday: 8:00 am to 6:00 pm
- Sundays and public holidays: no work.

TfNSW are to be notified of any work to be undertaken between 8:00am and 6:00pm on Saturdays (the allowable work hours on Saturdays identified in the Infrastructure Approval) and must be notified no later than 12:00 pm on the Thursday immediately prior to the Saturday proposed to undertake work. This notification will typically occur through TfNSW's review and approval of draft community notifications.

These hours take precedent from the standard construction hours identified in CNVG . There are exemptions to these standard hours of work as outlined in Section 3.1.

2.2 Out of Hours Works Periods

Certain activities may need to be carried out outside of approved standard hours where the requirements of the NSW CoA are satisfied. OOHW can be divided into two periods of sensitivity:

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

Standard hours of work for construction of the M12 Central package are summarised in Table 2-1. Note that this does not include Highly Noise Intensive Works which are subject to additional restrictions as described in Section 2.3.

TfNSW are to be notified of Approved OOHW to be undertaken (see Section 3.3). The notification to TfNSW will typically occur through TfNSW's review and approval of draft community notifications. The ER is to be provided with a copy of community notifications if requested.

Table 2-1: Construction Hours

Hour commencing	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Monday																								
Tuesday																								
Wednesday																								
Thursday																								
Friday																								
Saturday																								
Sunday																								
Public Holiday																								

OOHW Period 2 | Standard Construction Hours (and Approved Construction Hours) | **OOHW Period 1 Evening** | Approved Standard Hours (TfNSW notification required) | **OOHW Period 1 Day** | **OOHW Period 2**

2.3 Highly Noise Intensive Works

In accordance with EPL condition L5.2 and NSW CoA E35, highly noise intensive works 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, and the location of the works means that it is likely to impact the same receivers, then not exceeding three hours, with a minimum cessation of work of not less than one hour.

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

Highly Noise Intensive Work is only permitted outside of these hours by an EPL and this OOHW Procedure. No blasting activities are permitted under the EPL or Infrastructure Approval.

The definition of Highly Noise Intensive Work (or High Noise Impact Activities and Work) is provided in Table 1 in the Infrastructure Approval, being any 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.

It also includes any other activity identified by the EPA, following an assessment of the character of the noise emitted by an activity based on the Noise Policy for Industry, Factsheet C considerations (EPA, 2017).

Highly Noise Intensive Work is to be considered as part of noise assessments used to determine the risk level. These activities will not always be considered 'high risk', but if the noise from a particular plant item is considered Highly Noise Intensive Work a five (5) dBA penalty is to be added to the noise source sound power level in the noise assessment. The noise assessment will determine the likely impact to sensitive receivers and inform the corresponding risk level.

For OOHW subject to this OOHW Procedure that involves the use of Highly Noise Intensive Work, Seymour Whyte will consider, wherever reasonable and feasible:

- Use of alternative quieter plant and equipment
- Planning works during less noise sensitive periods (e.g. try and complete highly noise intensive works as early in the night as possible)
- Schedule highly noise intensive equipment prior to 10 pm and/or midnight.

Note – there may be instances where Highly Noise Intensive Work will be required after 10 pm and/or midnight as outlined above. Examples where this might occur include specific conditions detailed in the Road Occupancy License (ROL), reinstating trafficable areas using whacker packers and asphalting plant at the end of applicable shifts.

For Highly Noise Intensive Work carried out under the EPL during out of hours, note that:

- The respite provisions as per the requirements of EPL condition L5.2(c) do not apply provided that all Highly Noise Intensive Work is undertaken prior to 12:00 am (midnight)
- Where Highly Noise Intensive Work is undertaken after 12:00 am (midnight), the respite provisions in EPL condition L5.2(c) apply.

High vibration impact is defined as any work that will exceed the human comfort vibration criteria provided in Section 5 of the CNVMP.

3 Out of Hours Works

Notwithstanding the standard construction hours and additional restrictions on Highly Noise Intensive Works, work may be undertaken outside of the hours specified in TfNSW QA specification G1, where it is required for safety reasons or in the event of an emergency, where it is low impact, or where it is undertaken by approval or agreement, as described in this section.

3.1 Application to work on Saturdays (approved standard hours)

In accordance with TfNSW QA specification G1, the contractual working days and nights of work 'standard construction hours' for the M12 Central package are between 7:00 am to 6:00 pm Monday to Friday inclusive but excluding public holidays and rostered days off. However in accordance with EPL condition L5.1 and NSW CoA E34, the approved construction hours also include 8:00 am to 6:00 pm Saturday.

Seymour Whyte must submit a request to TfNSW to work outside of the contractual working hours in TfNSW QA specification G1. Any application for OOHW is to demonstrate that the proposed OOHW is compliant with the relevant CoA and EPL conditions. The TfNSW contract manager (or delegated person) would forward the relevant OOHW application to the TfNSW Environment team, TfNSW Comms and ER for information and comment. The TfNSW contract manager (or delegated person) approves the OOHW in accordance with G1 based on advice from TfNSW Environment team, TfNSW Comms and the ER.

TfNSW are to be notified of any work to be undertaken between 8:00am and 6:00pm on Saturdays (the allowable work hours on Saturdays identified in the Infrastructure Approval) and must be notified no later than 12:00 pm on the Thursday immediately prior to the Saturday proposed to undertake work. This notification will typically occur through TfNSW's review and approval of draft community notifications.

3.2 Exemptions to standard working hours

There are a number of exemptions, where works are approved to occur outside of the approved standard hours (as identified in Section 2.1) if one or more of the following circumstances are triggered, as permitted by EPL condition L5.3, EPL condition L5.4, and NSW CoA E36(a) and (b). For works subject to these exemptions, the requirements of NSW CoA E37 do not apply.

3.2.1 Safety and emergency

OOHW may be undertaken for safety reasons or in the event of an emergency, including:

- For the delivery of materials required by the NSW Police Force or other authority for safety reasons
- Where it is required in an emergency (Emergency Works) to avoid injury or the loss of life, to avoid damage or loss of property, or to prevent environmental harm.

In the event of Emergency Works, notification procedures in Section 5.4 are to be implemented.

3.2.2 Low impact out of hours works

Low impact OOHW may be undertaken outside of the approved standard hours. Low impact OOHW, includes all work activities 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).

Adequate assessment of work activities is required to demonstrate that the proposed works are low impact. An OOHW Permit (Attachment 1) is to be used to demonstrate compliance. Evidence of these assessments and/or the OOHW Permit is to be provided to TfNSW and ER prior to the works or as soon as practicable.

3.3 Approved OOHW

In addition to the exemptions to standard working hours, OOHW may be carried out where it is subject to an approval in accordance with NSW CoA E36(c), including:

- Where different construction hours are permitted or required under an EPL in force in respect of the CSSI (see Section 3.3.1); 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 (see Section 3.3.2); or
- Where negotiated agreements with directly affected residents and sensitive land uses have been reached (see Section 3.3.3).

Adequate justification of the need for OOHW is required to be developed in accordance with the CNVG , ICNG and EPL, or where OOHW is required, such as:

- For technical considerations (such as the need to meet particular quality specifications)
- To maintain the safety of road users or construction personnel
- Where a road occupancy license will not be provided during standard times
- For delivery of materials for safety reasons
- 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.

3.3.1 Approved by an EPL

The vast majority of out of hours works on the M12 Central package will be undertaken subject to the EPL. Where undertaking works under the EPL, works must be undertaken in accordance with the EPL conditions. The OOHW Permit (Attachment 1) is to be used to confirm compliance with EPL conditions. The ESR (or delegate) is responsible for the approval of all OOHW Permits. A copy of an OOHW Permit is to be provided to TfNSW and ER prior to the works or as soon as practicable.

An EPL holder can apply to vary the conditions of the licence. The application form for this purpose is available from the EPA. The EPA may also vary the conditions of the EPL at any time by written notice without an application being made. Where a licence has been granted in relation to development which was assessed under the EP&A Act in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

The ESR will be responsible for the preparation of EPL variations seeking approval to undertake works outside of the approved standard hours which are managed in accordance with the EPL.

As part of the noise and vibration assessment process, Seymour Whyte will ensure all OOHW permitted by either the EPL or the OOHW protocol (see Section 3.3.2); are co-ordinated ensure cumulative impacts are considered and that appropriate respite and/or mitigation measures for potentially affected sensitive receivers are implemented.

3.3.2 Approved by the OOHW Protocol (for works not subject to the EPL)

The vast majority of works on the M12 Central package will be undertaken subject to the EPL. However there may instances where Seymour Whyte are required to work outside of the EPL requirements. Typically, OOHW that is not subject to an EPL will involve service investigations, relocations and other works items that are not scheduled activities under the POEO Act (and associated regulations) and are outside the EPL premise boundary. These instances are to be discussed with TfNSW and the EPA to confirm compliance with the EPL requirements.

For the approval of OOHW not subject to the EPL, the procedures outlined in the OOHW Protocol, part of the OCEMP, are to be complied with. An assessment of risk factors is required to determine the approval pathway for these works. For Low-Risk activities the ER is the relevant approval authority. For High-Risk activities, the Planning Secretary (or delegate) is the relevant approval authority. Where the ER determines that the work activity is High-Risk, approval for the out of hours works through this pathway must be submitted to the Planning Secretary for approval.

3.3.3 Approved by Community Agreement

OOHW may be undertaken where a Community Agreement between Seymour Whyte and a substantial majority of the affected noise sensitive receivers has been reached in consideration of the requirements of EPL condition E1 and NSW CoA's E39, E46 and E47, and approval received through the process outlined in Section 8. Any Community Agreement to permit works to be undertaken outside of the approved standard hours must:

a) Be prepared in writing and implemented in accordance with the relevant sections of the TfNSW CNVG , ICNG, Noise Policy for Industry (EPA, 2017) and AS2346-2010 *"Guide to noise and vibration control on construction, demolition and maintenance sites"*;

b) Detail the following:

i) the actual works proposed

ii) any expected impacts in clear, simple English based on noise modelling

iii) the expected duration of the works

iv) any expected benefits for receivers

v) any other concurrent OOHW that will be occurring as a result of other Project activities

vi) any other OOHW as a result of Project activities that will be occurring on the nights preceding and following the proposed works or, if the proposed work precedes or follows a weekend period, any other OOHW that will be occurring on the weekend.

c) Demonstrate that the noise sensitive receivers party to the Community Agreement understand the nature of the works and any predicted impacts

d) For any Community Agreement that is longer than 21 calendar days, demonstrate that the community has been consulted in relation to re-engagement periods for the purpose of determining agreement from the community is maintained and continuing

e) Community Agreements will be used to support an OOHW approval request where they are intended to be used to provide justification for OOHW with approval for implementation sought through the process outlined in Section 8

f) Be kept for the duration of the Community Agreement and made available to TfNSW, the ER EPA and the Planning Secretary on request

g) Undertake community notification as required by Section 6.

In relation to consulting and engaging with noise sensitive receivers for a Community Agreement, the following applies:

a) All noise sensitive receivers predicted by modelling to be impacted by noise greater than 5 dB(A) above RBL must be consulted on any proposed Community Agreement. This includes noise sensitive receivers that have declined to participate in previous agreements

b) All proposed agreements must include details for interpreting services for languages other than English where required

c) If the Seymour Whyte is unable to contact a noise sensitive receiver after three attempts, including leaving "sorry I missed you" cards explaining the reason for the visit and requesting a return phone call, then it will be noted that the receiver could not be contacted and the receiver will not be considered to have either agreed or disagreed

d) Records of the attempts to contact the receiver will be kept by on file.

Agreement Thresholds

The following agreement thresholds will be observed when considering if a substantial majority of the affected community have agreed to OOHW (note both apply):

a) Noise sensitive receivers predicted to be impacted by noise levels exceeding those specified in Section 3.2.2 of this OOHW Procedure

b) Noise sensitive receivers predicted to be impacted by noise levels above a highly noise affected level of 75dB(A).

The agreement threshold will be determined by the EPA and no set threshold has been set in the EPL

Agreements by Phone

Where a Community Agreement has been reached with noise sensitive receivers over the phone, the following applies:

a) The phone script used to describe the proposed agreement (including information required under EPL condition E1.3 and NSW CoA E47 is to be provided to EPA or Planning Secretary with the Community Agreement for approval

b) The script must include a clear question requesting receiver agreement to the proposal

c) Detailed records are to be maintained of all Community Agreement phone conversations and must be maintained for the duration of the Community Agreement

d) Any noise sensitive receiver who requests a copy of the phone agreement must be supplied with one.

Notification

All noise sensitive receivers must be advised of any Community Agreement that has been attained in writing within seven calendar days of the agreement being finalised and must:

a) Include a website link to the project website, specifically to a summary of the approved project agreement

b) Include details of the Project 24-hour complaints line.

The notification requirements in Section 6 also apply to Community Agreements and must comply with the OCS.

Noise Monitoring

A noise validation monitoring plan must be submitted to the EPA for approval as part of the Community Agreement documentation prior to any OOHW occurring.

In accordance with EPL condition E1.8, validation monitoring must be undertaken for any works that are the subject of the Community Agreement and must:

a) Be performed by a suitably qualified and experienced person

b) Be performed on at least the first 2 nights where OOHW will be undertaken

c) Be performed on any other night where the nature of the works is likely to cause greater noise impacts than the first 2 nights

d) Be representative of the impacts

e) Be undertaken in accordance with the validation monitoring plan prepared under EPL condition E1.7 for the works that are the subject of the Community Agreement

f) Be recorded and provided to an EPA officer upon request.

If validation monitoring undertaken under EPL condition E1.8 shows that noise levels are higher than those predicted by any noise modelling undertaken as part of the Community Agreement, work practices must be modified immediately so that measured noise levels do not exceed predicted levels.

Where it has been determined that works cannot be modified to achieve the predicted noise levels:

a) the licensee must report immediately to the EPA; and

b) the EPA may terminate the community agreement.

Ongoing community engagement and agreement

For any community agreement longer than 21 calendar days to remain valid, it must be demonstrated that agreement from the community is maintained and continuing. To demonstrate that the agreement from the community is maintained and continuing Seymour Whyte must:

a) Engage the community to determine if a substantial majority of noise sensitive receivers continue to support the agreement pursuant to the re-engagement period determined under EPL condition E1.3(d)

b) Provide the EPA with a report within seven (7) calendar days of the end of each re-engagement period summarising the community response and comparing community agreement rates against previous community agreement rates.

Where Seymour Whyte is unable to demonstrate a substantial majority of agreement from the community is maintained and continuing the ESR must report immediately to the EPA; and the EPA may terminate the Community Agreement.

4 Assessment of risk factors

4.1 Noise assessments

A quantitative noise assessment is to be developed in accordance with the NSW CoA, the CNVG , EPL, this OOHW Procedure and the Interim Construction Noise Guideline (DEC, 2009) and will:

- Describe the works/activities proposed outside of the approved standard hours
- Identify the exceedances of construction scenarios against the NMLs adopted for each Noise Catchment Area (NCA) or other sensitive land uses (see Section 5 of the CNVMP)
- Determine the extent of noise impacts the construction activities will have on sensitive receivers, including predicted noise levels[1], frequency and duration of OOHW, awakening events/sleep disturbance
- Determine the appropriate standard and additional mitigation measures
- Consider if feasible and reasonable work practices have been identified to minimise the noise. See Section 1.4.3 for details on NVIS
- Provide a monitoring plan to validate the noise predictions, based on monitoring at the boundary of representative sensitive receivers during noise generating activities that are representative of the works and activities, including during the period/s predicted to have the highest noise level impacts.

4.2 Vibration assessments

An assessment will be required for vibration intensive OOHW within the safe working distances for human comfort (refer to Section 5 of the CNVMP) 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.

[1] Provide predictions of LAeq (15 minute) dB noise levels at noise sensitive receivers from these works and activities, where noise levels are predicted to be greater than those permitted under EPL condition L5.3

5 Scheduling Works and Respite

5.1 Hierarchy of Preferred Working Hours

Where work outside of the standard construction hours is planned to take place the following hierarchy of preferred working hours must be considered when timetabling works unless otherwise agreed with affected community through consultation (Section 6.1).

1. Saturday morning periods between 8am and 1pm (approved standard hours)
2. Saturday afternoon periods between 1pm and 6pm (Daytime OOH, also applicable to HNIW)
3. Sunday and public holiday day periods between 8am and 6pm (Period 1 Day)
4. Weekday evening periods between 6pm and 10pm (Period 1 Evening)
5. Weekend evening periods between 6pm and 10pm (Saturdays Period 1 Evening/Sundays Period 2)
6. Weekend night periods between 10pm and 8am (Period 2)
7. Work during the weekday evening and night and scheduling the noisiest or vibration intensive work first (between 6pm and 10pm) to minimise sleep disturbance impacts in the night period between 10pm and 7am) (Period 1 Evening & Period 2)
8. All other times outside recommended standard hours.

This hierarchy does not apply to Emergency Work. This hierarchy is also provided in Section 5.3.4 of the CNVMP.

5.2 Road Traffic Noise

When planning OOHW, consideration must be given to minimising road traffic noise caused by construction of M12 Central package, including but not limited to:

- Restricting heavy vehicle movements to standard hours; and/or
- Planning heavy vehicle haulage routes that have fewer sensitive receivers.

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

Where noise levels increase by more than 2 dB (i.e. 2.1 dB or greater) further assessment is required using the criteria presented in the RNP.

5.3 Co-ordination of OOHW with third parties

All OOHW, including works undertaken by a third party, will be co-ordinated with other Project packages, and 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 receivers in consultation with managers of other nearby projects that are likely to result in a cumulative impact. This will include:

- Coordination between Project packages, and other projects
- 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).

5.4 Emergency Works

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

- An emergency (i.e. an unforeseen occurrence; a sudden and urgent occasion for action); and
- Required to avoid injury, loss of life, damage or loss of property or prevent environmental harm.

On becoming aware of the need for Emergency Works in accordance with EPL condition L5.4 and NSW CoA E36(a)(ii), TfNSW, the ER, the EPA and the Planning Secretary must be notified, including the reasons for such emergency work. The EPA's Environment Line must be notified as soon as practicable.

As a form of mitigation, the construction team will use best endeavours to notify all affected sensitive receivers of the likely impact and duration of the Emergency Works. These notifications will generally be prepared using a small hand-completed information card for distribution to properties immediately adjacent to or impacted by the Emergency Works. These cards should include the following details as a minimum:

- Scope
- Location
- Hours
- Duration
- Types of equipment to be used
- Likely impacts
- Project 24-hour Telephone Contact Number, postal address and email address.

On the next business day after the Emergency Works commenced, a written Emergency Works report is to be prepared and submitted to TfNSW, ER and to the EPA (by 2:00 pm), including as a minimum:

- Date, time, duration and cause of the emergency
- Description of emergency works undertaken
- Mitigation measures implemented to address the impacts of the emergency works

- Actions/Measures taken or to be taken to prevent or mitigate recurrence of the emergency. If there are no appropriate actions/measures, explanation is to be provided as to why.
- Review of programmed works schedule following an occurrence of Emergency Works with the aim of achieving the required respite requirements.

6 Consultation

6.1 Community Consultation

In order to undertake works outside the hours specified under EPL condition L5.1 / NSW CoA E34, appropriate respite periods for the OOHW must be determined in consultation with the community at each affected location on a regular basis.

Appropriate work and respite periods must be identified in consultation with the community at three monthly intervals (at a minimum). NSW CoA E47 requires that 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

d) Likely mitigation and management measures which aim to achieve the relevant noise management levels and vibration criteria under NSW CoA 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).

Consultation mechanisms will be consistent with those nominated in the OCS and CSEP, and tailored to the affected community as advised by the Seymour Whyte Community Relations Manager, in conjunction with TfNSW.

A variety of communication and engagement tools and techniques are required to achieve adequate engagement objectives. These tools include (but are not limited to) a project website, a 24 hour toll-free project information line, information brochures, fact sheets, face-to-face interaction and community information sessions, and will be used to achieve the consultation outcomes required for NSW CoA E47 and to inform respite preferences. The OCS identifies additional consultation required for out-of-hours work and noisy work.

Where additional mitigation measures are proposed, the Seymour Whyte Community Relations Manager 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 Permit.

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 TfNSW ESM (or delegate), TfNSW Project Manager, ER, EPA and the Planning Secretary for information prior to work scheduled for the subject period being undertaken.

6.2 Community Notification

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

In accordance with EPL condition L5.7, affected noise sensitive receivers must be notified of works outside of the approved standard hours not less than five (5) calendar days and not more than 14 calendar days before those works are to be undertaken. Further details on community notification requirements are outlined in the CNVG , OCS and CSEP. Community notifications are to be implemented in accordance with these documents.

7 Determining mitigation

7.1 Standard Mitigation Measures

The CNVMP Section 8.5 includes the standard mitigation and management measures that apply to works undertaken for the M12 Central package, with reference to the CNVG, the ICNG and in accordance with the Infrastructure Approval. These standard mitigation measures apply to all works and will be implemented as appropriate.

7.2 Additional Mitigation Measures

Additional mitigation measures specifically relating to OOHW and residual impacts are outlined in Table 7-1. Details of how these additional mitigation measures will apply to a specific activity will be outlined in the OOHW approval request and associated documents.

Table 7-1: Additional mitigation measures

Action required	Applies to	Details
Periodic Notification	All OOHW	Stakeholder consultation to be completed in compliance with the OCS and as noted in Section 6 of this OOHW Procedure.
Specific Notification	OOHW causing: • Airborne noise • Ground-borne noise & vibration Where triggered by Table C.1 of CNVG	Stakeholder consultation to be completed in compliance with the OCS and as noted in Section 6 of this OOHW Procedure.

Action required	Applies to	Details
Verification Monitoring	OOHW causing: • Airborne noise • Ground-borne noise & vibration Where triggered by Table C.1 of CNVG or as requested by the ER	Verification monitoring of noise and/or vibration during construction may be conducted at the affected receiver(s) or a nominated representative location (typically the nearest receiver where more than one receiver has been identified). Monitoring can be in the form of either unattended logging (i.e. for vibration provided there is an immediate feedback mechanism such as SMS capabilities) or operator attended surveys (i.e. for specific periods of construction noise). The purpose of monitoring is to confirm that: • Construction noise and vibration from the project are consistent with the predictions in the noise assessment; and/or • Identifying actual impacts of activities on sensitive receivers, such as: ◦ noise levels after implementation of noise reducing mitigation (mufflers, baffles, screens). ◦ vibration during construction in close proximity to structures; and/or • Mitigation and management of construction noise and vibration is appropriate for receivers affected by the works Where noise monitoring finds that the actual noise levels exceed those predicted in the noise assessment then immediate refinement of mitigation measures may be required and the CNVIS amended. Refer to Appendix F of the CNVG for more details.
Respite Offer	OOHW causing: • Airborne noise • Ground-borne noise & vibration Where triggered by Table C.1 of CNVG or as requested by the ER	The purpose of a project specific respite offer is to provide residents subjected to lengthy periods of noise or vibration respite from an ongoing impact. The offer could comprise pre-purchased movie tickets, bowling activities, meal vouchers or similar offer. This measure is determined on a case-by-case basis.
Phone calls	OOHW causing: • Airborne noise • Ground-borne noise & vibration Where triggered by Table C.1 of CNVG or as requested by the ER	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. Stakeholder consultation to be completed in compliance with the OCS and as noted in Section 6 of this OOHW Procedure.

Action required	Applies to	Details
Individual briefings	OOHW causing: • Airborne noise • Ground-borne noise & vibration Where triggered by Table C.1 of CNVG or as requested by the ER	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 Table C.1 of the CNVG and the mitigation measures that will be implemented for the work. The Stakeholder and Engagement Manager will identify the relevant sensitive receivers through the noise and vibration impact assessment and visit identified stakeholders as part of the planning for the OOHW 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 works. Where the resident cannot be met with individually, then an alternative form of engagement will be used. Stakeholder consultation to be completed in compliance with the OCS and as noted in Section 6 of this OOHW Procedure.
Alternative Accommodation or other agreed mitigation measures	OOHW causing: • Airborne noise • Ground-borne noise & vibration Where triggered by Table C.1 of CNVG or as requested by the ER	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 2, i.e. 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.

Action required	Applies to	Details
Respite Periods	OOHW causing: • Airborne noise • Ground-borne noise & vibration Where triggered by Table C.1 of CNVG or as requested by the ER	All work will be scheduled to enable respite periods. The construction team 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. 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. Works that generate noise up to the "Clearly Audible" OOHW classification as outlined in Section 8.6 of the CNVMP, is to be no more than the following durations, as experienced by the same noise sensitive receiver (unless otherwise permitted through a separate approval, e.g. Duration Respite): • Two (2) consecutive evenings and/or nights at any time • Three (3) evenings and/or nights per week • 10 evenings and/or nights per month. Where possible, Highly Noise Intensive Works shall be completed before 10pm.
Duration Respite	OOHW causing: • Airborne noise • Ground-borne noise & vibration Where triggered by Table C.1 of CNVG or as requested by the ER	Where Respite Periods (see management measure above) are considered to be counterproductive to reducing noise and vibration impacts to the community it may be beneficial to increase the number of consecutive evenings and/or nights through Duration Respite to minimise the duration of the activity. This measure is determined on a case-by case basis and will only be implemented through the Community Agreement processes outlined in Section 3.3.3. Evidence of community support for Duration Respite must be provided as justification for the Duration Respite as part of an OOHW approval request if it is to be used as a mitigation strategy. A community engagement strategy must be agreed with and implemented in compliance with the OCS.

The additional management measures in Table 7-1 may become less effective over time. At-receiver noise mitigation may be considered where feasible and reasonable, where all options for at-source noise mitigation and management measures have been exhausted. At-receiver mitigation may include temporary window and door screens, temporary localised shielding or other permanent forms of mitigation.

Feasible and reasonable considerations for providing at-receiver treatments should include: Time of day where construction noise exceeds the NML; Time of use of affected receivers; Amount construction noise exceeds the NML; How long the mitigation will provide benefit to the receiver during the project; Optimal design of acoustic sheds and noise barriers/hoardings.

Where additional mitigation measures are proposed, consultation would be carried out by the Seymour Whyte Community Relations Manager (or delegate) in conjunction with TfNSW with affected sensitive receivers to ensure that their personal circumstances have been taken into consideration to identify the most appropriate mitigation measures. This must be done as part of the OOHW Permit.

8 Approval of Out of Hours Works

The following approval process will be followed for proposed out of hours works subject to an EPL:

1) The M12 Central OOHW Permit (Attachment 1) will be commenced by relevant Seymour Whyte staff and submitted to the ESR for review.
2) NVIS to be developed as required including identify controls, scheduling etc and determining standard, specific and additional mitigation measures.
3) The OOHW Permit (Attachment 1) will be finalised by the ESR (or delegate) and include information on:
    - Activities
    - Required plant and equipment
    - Location
    - Duration
    - Justification for the work
    - Scheduling of works in accordance with Section 5 of this OOHW Procedure
    - Details of consultation with the community regarding respite periods and scheduling as outlined in Section 6 of this OOHW Procedure
    - Details of the completed quantitative noise and vibration assessment (see Sections 4.1 and 4.2) including predicted impacts and appropriate management measures in accordance with Section 7 of this OOHW Procedure.
4) The Seymour Whyte Community Relations Manager will develop a community notification required for the OOHW and submit to TfNSW for approval in accordance with the CSEP and OCS.
5) Following endorsement of each OOHW request by the ESR, and approval of the notification by TfNSW, community consultation and notification in accordance with Section 6 of this OOHW Procedure will be undertaken.
6) Where works are being approved through a Community Agreement (see Section 3.3.3), the Community Agreement must be submitted to the EPA for approval at least 15 business days prior to any works that are the subject of the agreement being undertaken. A copy of the Community Agreement is to be kept on site by Seymour Whyte for the duration of the EPL and also be made available on Seymour Whyte's project website for the duration of the agreement (personal details of noise sensitive receivers must be omitted).
7) Once the relevant authority approvals have been awarded, the ESR will endorse and issue the internal OOHW permit for sign-off and issue to the construction team.
8) Noise monitoring and reporting will be carried out in accordance with the Construction Noise and Vibration Monitoring Program, and Section 9.6 of the CNVMP.

9 Compliance management

9.1 Roles and responsibilities

The organisational structure for the M12 Central package and overall roles and responsibilities are outlined in Section 5.1 of the CEMP. Specific responsibilities for the implementation of standard mitigation measures are detailed in Section 8 of the CNVMP.

The ESR is responsible for endorsing all OOHW (refer to Attachment 1). TfNSW are to be notified of Approved OOHW to be undertaken. This notification will typically occur through TfNSW's review and approval of draft community notifications.

The Seymour Whyte Community Relations Manager, in conjunction with TfNSW, will be responsible for ensuring that notification and consultation has occurred with community stakeholders, in accordance with CoA, EPL and OCS, on the likely impacts of OOHW activities.

The ESR will implement and oversee the Construction Noise and Vibration Monitoring Program for OOHW to assess compliance with the CoA, the EPL and the OOHW Procedure. The ESR is also responsible for notifying the ER, EPA and Planning Secretary of any noise exceedances or complaints during OOHW.

9.2 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 Procedure. Training will include inductions, toolbox talks, pre-starts and targeted training as required.

9.3 Monitoring and inspections

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

Noise and vibration monitoring will also occur routinely for the duration of the M12 Central package, in accordance with the Construction Noise and Vibration Monitoring Program, which is detailed in Appendix B of the CNVMP. The Construction Noise and Vibration Monitoring Program details when monitoring will be undertaken, as well as the representative locations adjacent to the construction works where noise and vibration monitoring will be undertaken.

Attended monitoring of OOHW will be carried out as determined by the quantitative noise assessment with consideration of the Additional Mitigation Measures identified in Section 7. Additional noise and vibration monitoring will also be carried out if complaints about an OOHW activity are received which is attributable to the works.

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 the relevant noise modelling undertaken as part of the

Community Agreement, work practices will be modified so that measured noise levels do not exceed predicted levels.

In the event that OOHW is undertaken without approval, or if approved OOHW are undertaken but not carried out in accordance with the conditions of the approval or required management measures, the non-conformances / non-compliances will be determined (refer to Section 7.3 of the CEMP) and be reported as an incident in accordance with TfNSW Incident Classification and Reporting Procedure.

9.4 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of the noise and vibration management measures, compliance with this OOHW Procedure, CNVMP, CoA, EPL and other relevant approvals, licenses, and guidelines. Audit requirements are detailed in Section 7.4 of the CEMP.

9.5 Reporting

Reporting requirements relevant to the management of noise and vibration, including OOHW are identified in Table 9-2 of the CNVMP. Reporting of noise and vibration monitoring results is detailed in the Monitoring Program (Appendix B of the CNVMP). Requirements and responsibilities for reporting are further described in Section 7.5 of the CEMP. Upon request of an authorised officer of the EPA, Seymour Whyte must provide within five (5) business days:

- Construction noise and vibration impact assessment(s) required by EPL condition L5.6(a)
- Noise monitoring results required by EPL condition L5.6(b)
- Written evidence demonstrating the works are necessary and permitted under EPL condition L5.6
- Any other relevant information or records requested by the EPA.

Accurate records will be maintained substantiating all construction activities associated with the M12 Central package or relevant to the conditions of approval, including measures taken to implement this OOHW Procedure. Records will be made available to the EPA, and DPHI upon request, within the timeframe nominated in the request.

9.6 Review and improvement

The continuous improvement will be achieved through the ongoing evaluation of environmental management performance as described in Section 10 of the CNVMP. The ESR is responsible for ensuring stage-specific environmental risks are identified and included in the M12 Central package risk register and appropriate mitigation measures implemented throughout the construction, as part of the continuous improvement process. The process for ongoing risk identification and management during construction is outlined in Section 4.1.2 of the CEMP.

The processes described in Section 7.7 of the CEMP may result in the need to update or revise this OOHW Procedure. This will occur as needed. Any revisions to this Plan and other Sub-plans will be in accordance with the process outlined in Section 1.12 of the CEMP. A copy of the updated OOHW Procedure and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure (refer to Section 7.6.2 of the CEMP).

Attachment 1 – M12 Central OOHW Permit

M12 Central package – Seymour Whyte (internal) Out of Hours Works (OOHW) Permit

SECTION A – APPLICATION DETAILS		
A1	Permit Number	YR-MT-OOHW-xx
A2	Title	
A3	Application Date	
A4	Permit raised by	
A6	Justification for the works (note: non-applicable clauses can be deleted)	**Exemptions to standard construction hours for:** ☐ L5.3 Low Noise Impact works ☐ L5.4 a) I Emergency works ☐ L5.4 a) ii Delivery of oversized plant, structures or materials - need confirmation from police or other authority that special arrangements need to apply. **Works approved outside the standard construction hours:** ☐ L5.5 a) High risk to construction personnel or public safety ☐ L5.5 b) High risk to road network operational performance ☐ L5.5 c) High risk to the operation and integrity of the utility network ☐ L5.5 d) Road authority have refused to issue a road occupancy licence during standard construction hours ☐ L5.5 e) Sydney Trains (or other rail authority) requires a rail possession **Community Agreement** ☐ E1.1 Agreement between the licensee and a substantial majority of noise sensitive receivers has been reached Proposed works do not fit into the exemptions, approved agreed work categories ☐ EPL variation application required ☐ Reschedule works to the Standard construction hours
A7	EPL revision at time of permit issue	EPL 21596, Licence version date: 06-Dec-2022
A8	SWC Foreman	Name: Mobile Number:
A9	Subcontractor (if applicable)	Subbie Name: Contact Name: Mobile Number:
	Traffic Management	☐ Required ☐ Not required If required, describe location and nature of traffic changes:

SWC AUTHORISATION		
A10	SWC Environmental Site Representative	Print name: Tom Bath Signature: Date:
A11	SWC Community and Stakeholder Manager	Print name: Jennifer Gatt Signature: Date:
A12	SWC Traffic Manager	Print name: Nino Boifava Signature: Date:

PERMIT RECIPIENT			PERMIT SURRENDER
A16	Project Engineer	Print name: Signature: Date:	Print name: Signature: Date:
A17	Foreman	Print name: Signature: Date:	Print name: Signature: Date:
A18	Subcontractor representative	Print name: Signature: Date:	Print name: Signature: Date:

PERMIT CLOSE OUT		
A19	SWC Environmental Site Representative	☐ The works under this permit have been completed and the permit is now closed Signature:

SECTION B – OUT OF HOURS WORKS ASSESSMENT		
B1	Description of the proposed activity	*Works include the following:* • *Details here*
B2	Proposed dates / duration	Start Date: Start Time: Finish Date: Finish Time: Contingency dates (if applicable): ☐ Works proposed over more than 2 consecutive nights
B4	Plant / equipment and number to be used Notes: Group by activity schedule where relevant to model separate activities. Add additional activities if required. Refer to attached plant list in supporting information	Scenario 1: Scenario 2: Scenario 3: Scenario 4: Scenario 5: Scenario 6: Scenario 7: Traffic Control Additional plant ☐ Light vehicles ☐ Deliveries ☐ Temporary lighting x number ☐ Generator(s) x number ☐ Hand tools ☐ Rattle guns
B3	Scheduling	☐ Morning Shoulder OOHW: ☐ Day OOHW: ☐ Evening Shoulder OOHW: ☐ Evening OOHW: ☒ Night OOHW:
B5	Concurrent construction activities	Describe concurrent construction activities and measures taken to coordinate concurrent works: (Attached evidence of consultation where relevant)

SECTION C – NOISE, VIBRATION AND LIGHT SPILLL ASSESSMENT

C1 — **Assessment prepared by acoustic consultant attached**

☐ **Yes – complete assessment below C2 – C7 and attach Knownoise assessment (CNVIS) for each activity / scenario proposed**

C2 — Noise management objectives

Reference NCA:

NCA	Monitoring location	Noise Management Level, $L_{Aeq\ 15\ minute}$								
		Standard hours		Outside approved hours						
		Noise affected	Highly noise affected	Morning shoulder	Day	Evening shoulder	Evening	Night	Sleep disturbance (CNVS)	
									$L_{Aeq,\ 15\ minute}$	L_{Amax}
NCA01	L01	55	75	50	50	49	49	45	45	55
NCA02	L01	55		50	50	49	49	45	45	55
NCA03	L05	49		44	44	44	44	40	40	52
NCA04	L03	64		59	59	53	53	42	42	52
NCA05	L02	46		41	41	41	41	39	39	52
NCA06	L05	49		44	44	44	44	40	40	52
NCA07	L06	44		39	39	39	39	36	36	52

C3 — Nearest Sensitive Receiver(s)

- Address(es): Refer attached Noise Assessment Summary
- Distance(es): Refer attached Noise Assessment Summary

☒ Map showing location of works and nearest sensitive receiver included in **attached Noise Assessment Summary**

C4 — Predicted Noise Level and nearest sensitive receiver

- Scenario 1 dB(A)
- Scenario 2 dB(A)
- Scenario 3 dB(A)
- Scenario 4 dB(A)
- Scenario 5 dB(A)
- Scenario 6 dB(A)

☒ Noise assessment (CNVIS) for each activity attached

C5 — Noise Screening assessment

Populate with perception level from Table 1 in the Supporting Information

Activity	Standard	Day OOH	Evening OOH	Night OOH	Sleep Disturbance
RBL	64	59	53	42	52
Activity 1					
Activity 2					
Activity 3					
Activity 4					
Activity 5					
Activity 6					

SECTION C – NOISE, VIBRATION AND LIGHT SPILLL ASSESSMENT		
C6	Maximum Predicted airborne LAeq(15min) noise level above RBL at nearest receiver Note: All sensitive receivers with impact clearly audible or higher should be identified and grouped by perceived impact levels Refer to Table 1 in the Supporting Information	☐ Morning Shoulder OOH ☐ Day OOH ☐ Evening Shoulder OOH ☐ Evening OOH ☐ Night OOH ☐ Sleep disturbance
C7	Vibration intensive plant such as rock breakers, piling rigs or vibratory rollers involved in works	☐ Not Required ☐ Yes: If yes, will work be required within Safe working distances for vibration intensive plant (CNVG):
C8	Temporary lighting	☐ Not Required ☐ Required *Lighting to be positioned to minimise light spill to nearby receivers.*

SECTION D MITIGATION MEASAURES AND MONITORING SCHEDULE		
D1	Site / activity specific mitigations to be implemented	☐ Scheduling: *Describe* ☐ Plant and equipment selection: *Describe* ☐ Shielding: *Describe* ☐ Noise attention curtains: *Describe*
D2	Describe alternative methods of construction or innovative technologies that would potentially reduce noise and vibration if the potential noise and vibration exceeds the relevant criteria	☐ Alternate methods:

D3	Additional mitigation measures (Refer to Attachment D)	☐ N – Notification ☐ SN – Specific Notification ☐ V – Verification ☐ IB – Individual Briefings ☐ RO – Respite Offer ☐ R1 – Respite Period 1 ☐ R2 – Respite Period 2 ☐ DR – Duration respite ☐ PC – Phone calls ☐ AA – Alternative Accommodation ☐ Justification if required mitigation measures is not implemented: *Describe*
D4	Additional noise and vibration mitigation measures as negotiated with affected residents and other sensitive receivers Attached evidence of consultation where relevant	☐ Not applicable ☐ Applicable - describe
D5	Noise Monitoring (additional to routine monitoring)	☐ Not applicable ☐ Applicable – verification monitoring will be undertaken to determine if predicted noise levels are achieved. Monitoring Locations:
D6	Vibration Monitoring (additional to routine monitoring)	☐ Not applicable ☐ Applicable - describe Monitoring Locations:
D7	Night time lighting defect inspection (required first time temporary night lighting is established at a new location)	☐ Not applicable ☐ Applicable – describe Monitoring Locations:

Construction Noise and Vibration Management Sub-plan

Appendix B – Construction Noise & Vibration Monitoring Program

M12 Motorway – Central

January 2025

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Document control

File Name	Construction Noise and Vibration Monitoring Program
Title	M12 Central CEMP: Appendix B2 Construction Noise and Vibration Management Sub-plan Appendix B - Construction Noise and Vibration Monitoring Program
Document Number (Teambinder)	M12CCO-SYW-ALL-EN-PLN-000005

Approval and authorisation

Plan reviewed by:	Plan reviewed by:
[redacted] Seymour Whyte Environmental Site Representative	[redacted] Seymour Whyte Project Manager
18/01/2025	18/01/2025
	

Revision history

Revision	Date	Description
A	18/02/2022	First draft for TfNSW review
B	29/04/2022	Updated in response to TfNSW review
C	27/06/2022	Updated in response to TfNSW review
D	27/07/2022	Updated in response to TfNSW and ER review
E	26/05/2023	Updated to reflect changes in accordance with RFI 383 and OCEMP
F	18/07/2023	Updated in response to OCEMP update
G	18/01/2025	Updated in response to OCEMP update

Contents

Figures

Tables

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
CEMP	Construction Environmental Management Plan
CNVG	Construction Noise and Vibration Guideline (Roads and Maritime 2016)
CNVMP	Construction Noise and Vibration Management Sub-plan
CoA	Condition of Approval
DAWE	Former Commonwealth Department of Agriculture, Water and the Environment (now Department of Climate Change, Energy, Environment and Water)
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)
DPIE	Former Department of Planning, Industry and Environment (now Department of Planning and Environment)
EES	Former Environment, Energy and Science
EHG	Environment and Heritage Group (a part of NSW DCCEEW)
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 – Minor Consistency Assessment for Proposed Change to the M12 Motorway Project (M12 Central) • Arcadis (rSeptember, 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 at 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 – East Site 48, 50 and 51 Boundary Changes Minor Consistency Assessment • Arcadis (January, 2024) M12 Motorway – Minor Consistency Assessment M12 Central Water Tower Access Road The documents that comprise the EPBC referral:

Abbreviation	Expanded Text
	• 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 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	Environmental Site Representative (Seymour Whyte)
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.
Monitoring Program, this	Construction Noise and Vibration Monitoring Program
NCA	Noise Catchment Areas
NML	Noise Management Level
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water (Formerly NSW DPE)
OCEMP	Overarching Construction Environmental Management Plan
OCNVMP	Overarching Construction Noise and Vibration Management Sub-plan
OOHW	Out-of-Hours Works – work completed outside of approved standard hours
POEO Act	NSW *Protection of the Environment Operations Act 1997*
Project, the	The CSSI as approved by the Minister for Planning and Public Spaces on the 23 April 2021 (SSI 9364)
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

Abbreviation	Expanded Text
TfNSW	Transport for New South Wales
VDV	Vibration dose value
WSIA	Western Sydney International Airport

1 Introduction

1.1 Context

This Construction Noise and Vibration Monitoring Program (Monitoring Program) is an appendix of the Construction Noise and Vibration Management Sub-plan (CNVMP) which forms part of the Construction Environmental Management Plan (CEMP) for the M12 Motorway – Central package.

This Monitoring Program has been prepared under the Overarching Construction Environmental Management Plan (OCEMP) and relevant sub-plans developed for M12 Motorway (the Project), to address the requirements of the Minister's Conditions of Approval (CoA), Revised Environmental Management Measures (REMMs) listed in Environmental Impact Statement (EIS), Submissions Report, Amendment Report, Amendment Report Submissions Report (ARSR), ARSR Amendment Report, all applicable legislation, and Transport for New South Wales (TfNSW) specifications.

1.2 Background

1.2.1 M12 Motorway (the Project)

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 Western Sydney International Airport (WSIA). The Project will be delivered in a number of stages (or work packages) as described in the Project Staging Report. A detailed Project description is provided in Section 2.1 of the CEMP.

1.2.2 M12 Central

Seymour Whyte has been engaged to deliver the M12 Motorway – Central package. Construction of the M12 Central package involves building 7.5 km section of motorway from west of Badgerys Creek to the Water Tower Access Road within Western Sydney Parklands. A detailed description of the M12 Central package is provided in Section 2.3 of the CEMP.

1.3 Scope of the program

The scope of this Monitoring Program is to describe how the environmental noise and vibration impacts from construction will be monitored during the delivery of the M12 Central package. This Monitoring Program has been prepared under and consistent with the OCEMP, and in particular the Overarching Noise and Vibration Monitoring Program which forms part of the Overarching Construction Noise and Vibration Management Sub-Plan (OCNVMP), considering relevant sensitive receivers and construction activities. In the preparation and ongoing implementation of this Plan, SMART (Specific, Measurable, Achievable, Realistic and Timely) principles are to be considered and applied.

This Monitoring Program has been developed to describe how environmental noise and vibration will be monitored in the immediate vicinity of construction sites. Operational monitoring measures do not fall within the scope and therefore are not included in this Monitoring Program. A copy of this Monitoring Program will be kept on the premises for the duration of construction.

1.4 Environmental Management Systems overview

The Environmental Management System (EMS) for the M12 Central package is described in Section 3 of the CEMP. To achieve the intended environmental performance outcomes, Seymour Whyte have established, implemented, maintained and continually improved an EMS in accordance with the requirements of ISO14001:2015. The Seymour Whyte EMS, which is consistent with overarching EMS described in the OCEMP, will be adopted as the guiding environmental management framework for the M12 Central package.

This Monitoring Program forms part of the environmental management framework for the M12 Central package, as described in Section 3.3 of the CEMP. This Monitoring Program has been developed consistent with the OCEMP including the Overarching Construction Noise and Vibration Monitoring Program, the CNVMP and the EMS.

1.5 Approval, review and modification

The Overarching Construction Noise and Vibration Monitoring Program 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 C11(a). This Monitoring Program will be reviewed by the TfNSW ESM (or delegate) and the ER to confirm it is consistent with, and incorporates, all relevant elements of the approved OCEMP, and in particular the Overarching Noise and Vibration Monitoring Program which forms part of the Overarching Construction Noise and Vibration Management Sub-Plan (OCNVMP), and other requirements, prior to submission to the Planning Secretary and Environment Protection Authority (EPA) for information. Construction of the M12 Central package will not commence until the CNVMP, and this Monitoring Program are endorsed by the ER and provided to the Planning Secretary and EPA for information.

The Monitoring Program will be implemented for the duration of construction and for any longer period set out in this Monitoring Program or as specified by the Planning Secretary, whichever is the greater. This Monitoring Program will be reviewed every six months by the Seymour Whyte Environmental Site Representative (ESR) in consultation with TfNSW. Minor amendments to this Monitoring Program may be provided to the ER for acceptance.

The ESR is responsible for the development of this Monitoring Program. Any amendments to the Monitoring Program will be documented in subsequent revisions of this Monitoring Program. All review comments provided by the ER on the Monitoring Program must be addressed to the satisfaction of the ER. A copy of the updated Monitoring Program and changes will be distributed to all relevant stakeholders in accordance with the document control procedure outlined in the CEMP. Site personnel with responsibilities relevant to noise and vibration monitoring will be informed of amendments to the Monitoring Program with appropriate training provided, as relevant.

1.6 Purpose and objectives

The purpose of this Monitoring Program is to describe how, where and when Seymour Whyte will monitor for environmental noise and vibration during construction of the M12 Central package. The key objective of this Monitoring Program is to ensure that noise and vibration impacts to sensitive receivers and the local community from construction of the M12 Central package are minimised.

See Section 2.2 of the CNVMP for further details objectives of this Monitoring Program. See Section 2.3 of the CNVMP for specific targets for the management of noise and vibration impacts during the delivery of the M12 Central package.

2 Environmental requirements

Section 3 of the CNVMP provides details of the relevant legislation, guidelines, protocols, standards and TfNSW QA specifications applicable to this Monitoring Program.

2.1 Conditions of Approval

The NSW CoA relevant to this Monitoring Program is provided 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 2-1: NSW CoA relevant to the preparation of this Monitoring Program

CoA no.	Condition	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	OCNVMP (Appendix B) Section 1.6 of the CNVMP
C13	Each Construction Monitoring Program must provide:	-
	(a) details of baseline data available;	Section 3.2
	(b) details of baseline data to be obtained and when;	Section 3.2
	(c) details of all monitoring of the CSSI to be undertaken;	Sections 3.5 and 3.6
	(d) the parameters of the CSSI to be monitored;	Section 3.5 Section 3.6
	(e) the frequency of monitoring to be undertaken;	Section 3.5 Table 3-10 Section 3.6 Table 3-11
	(f) the location of monitoring;	Section 3.7
	(g) the reporting of monitoring results and analysis of results against the relevant criteria;	Section 4.3
	(h) details of methods that will be used to analyse monitoring data;	Section 4.2
	(i) procedures to identify and implement additional mitigation measures where results of monitoring indicate unsatisfactory CSSI impacts;	Section 4.2
	(j) a consideration of SMART principles;	Section 1.3
	(k) any consultation to be undertaken in relation to the monitoring programs; and	Section 1.6 of the CNVMP
	(l) any specific requirements as required by Condition C14.	Section 3.5 Section 3.6

CoA no.	Condition	Reference
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;	Section 3.5 Section 3.6
	(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 3.5
	(c) method and frequency for reporting monitoring results; and	Section 4.3
	(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 4.2
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 1.5
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 4.3
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) 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 3

CoA no.	Condition	Reference
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 3.6 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-listed structures.	Section 3.5.1 Section 3.6.1 Section 8 of the CNVMP

2.2 Revised Environmental Management Measures

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

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

REMM	Requirement	Reference
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 3.5 Section 3.6 Section 4.2 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 3.6 Section 8 of the CNVMP

REMM	Requirement	Reference
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. 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.	Section 3.6 Section 4.2 Section 8 of the CNVMP
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.	Section 3.6 Section 4.2 Section 8 of the CNVMP

3 Noise and Vibration Monitoring

3.1 Noise and vibration sensitive receivers

The noise and vibration assessment in the EIS, Submissions Report, Amendment Report, ARSR and ARSR Amendment Report (collectively Environmental Assessment Documentation), identified and considered potential construction noise and vibration impacts for each habitable dwelling or park along the Project alignment, including the M12 Central package, and within 1,200 metres either side of the new or existing road centre line.

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. The alignment of the M12 Central package is mainly through semi-rural properties with few residences.

Noise Catchment Areas (NCAs), that reflect comparable land uses, nature and types of receivers within an area, were established as part of the EIS noise assessment as detailed in Table 3-1.

Table 3-1: Noise Catchment Areas for the M12 Central package

NCA	Minimum distance[1]	Description
NCA03	440 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 construction footprint on Mamre Road.
NCA04	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 Street. It is primarily residential with the nearest receivers located adjacent the construction footprint to the north of Elizabeth Drive.
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
NCA06	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.
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 construction footprint.

Notes: (1) Approx. minimum horizontal distance in metres from the construction footprint to the nearest sensitive receiver

The identified noise sensitive receivers and the NCAs relevant for the M12 Central package are shown in Figure 3-1. The predicted noise contours for the 'bulk earthworks – peak impact scenario' have been included as a reference for predicted construction noise impacts. Project wide predicted construction noise contours, including M12 Central package, 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.

3.2 Existing environment (baseline data)

A summary of the background noise and vibration levels is provided in Section 4 of the CNVMP. As referenced in the Amendment Report, it is considered that the baseline data obtained during the development of the EIS is sufficiently comprehensive and that no further baseline data is required to be collected. Notwithstanding, attended noise monitoring will be carried out prior to the commencement of construction to verify the background noise environment.

Unattended noise surveys in and around the M12 Central package were conducted at five 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 M12 Central package. The monitoring equipment was generally located at receivers which will have line-of-sight to the M12 Central package or to existing major roads.

The rating background level (RBL) has been used to determine an 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 for the M12 Central package is provided in Table 3-2.

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

ID	Background noise (RBL) Periods based on extended construction hours[1]					Average noise level LA_{eq} (period) based on Road Noise Policy[2]	
	Morning shoulder	Day	Evening	Evening Shoulder	Night	Day 15 hour	Night 9 hour
L02	47	36	39	41	34	46	45
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

Notes:

(1) 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

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

Prior to the commencement of construction, Seymour Whyte will carry out additional attended baseline monitoring to verify the background noise environment data recorded during the development of the Environmental Assessment Documentation. 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.

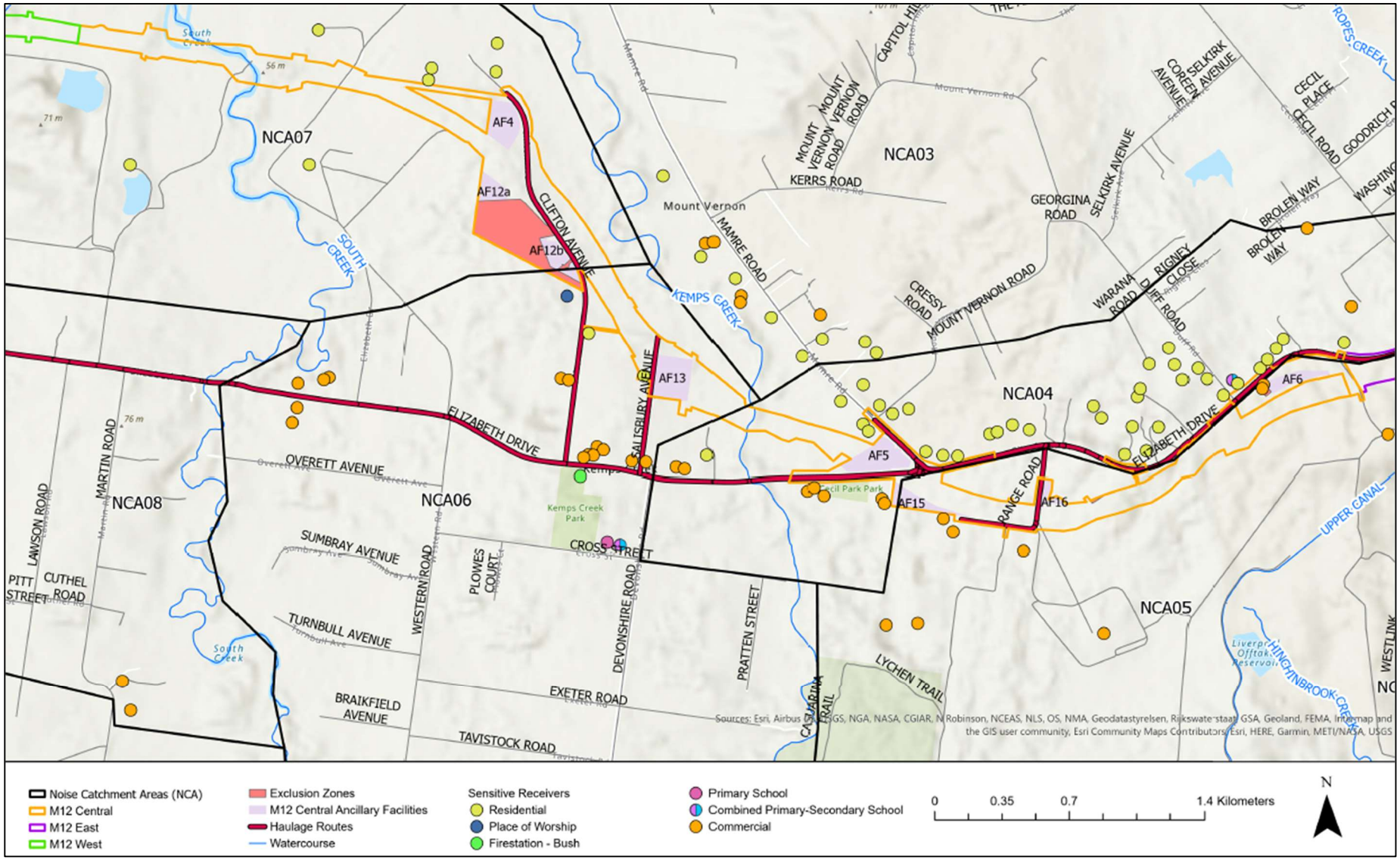
NCA07
NCA08
NCA06
NCA04
NCA03
NCA05
AF4
AF12a
AF12b
AF13
AF5
AF6
AF15
AF16
CLIFTON AVENUE
SOUTH CREEK
KEMPS CREEK
MAMRE ROAD
Mount Vernon
KERRS ROAD
MOUNT VERNON ROAD
CRESSY ROAD
GEORGINA ROAD
SELKIRK AVENUE
CECIL PLACE
CECIL ROAD
GOODRICH
BROLEN WAY
WARANA ROAD
RIGNEY CLOSE
ELIZABETH DRIVE
SALISBURY AVENUE
OVERETT AVENUE
MARTIN ROAD
LAWSON ROAD
SUMBRAY AVENUE
WESTERN ROAD
PLOWES COURT
CROSS STREET
DEVONSHIRE ROAD
PRATTEN STREET
RANGE ROAD
PITT STREET
CUTHEL ROAD
TURNBULL AVENUE
BRAIKFIELD AVENUE
EXETER ROAD
TAVISTOCK ROAD
LYCHEN TRAIL
CASUARINA TRAIL
UPPER CANAL
HINCHINBROOK CREEK
ROPES CREEK
Kemps Creek Park
Cecil Park Park
Noise Catchment Areas (NCA)
M12 Central
M12 East
M12 West
Exclusion Zones
M12 Central Ancillary Facilities
Haulage Routes
Watercourse
Sensitive Receivers
Residential
Place of Worship
Firestation - Bush
Primary School
Combined Primary-Secondary School
Commercial
0
0.35
0.7
1.4 Kilometers
N

Figure 3-1: Location of noise catchment areas and noise and vibration sensitive receivers

3.3 Construction noise criteria

Based on the recorded RBLs, the noise criteria, including NMLs adopted for the M12 Central package is set out in Table 3-3 for residential receivers and in Table 3-4 for non-residential receivers.

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

NCA	Monitoring location	NML LAeq(15min) (dBA)						Sleep disturbance screening criteria (RBL + 15 dB)
		Standard construction (RBL + 10dB)	Out of hours (RBL + 5dB)					
		Day[1]	Morning shoulder[2]	Day[3]	Evening[4]	Evening shoulder[5]	Night[6]	
NCA03	L05	49	44	44	44	44	40	50
NCA04	L03	64	59	59	53	53	42	52
NCA05	L02	46	41	41	41	41	39	49
NCA06	L05	49	44	44	44	44	40	50

NCA	Monitoring location	NML LAeq(15min) (dBA)						
		Standard construction (RBL + 10dB)	Out of hours (RBL + 5dB)					Sleep disturbance screening criteria (RBL + 15 dB)
		Day[1]	Morning shoulder[2]	Day[3]	Evening[4]	Evening shoulder[5]	Night[6]	
NCA07	L06	44	39	39	39	39	36	46

Notes:

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

(2) 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

(3) 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

(4) 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

(5) 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

(6) 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

Table 3-4: 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		
Passive recreation areas[1]	External	60
Active recreation areas[2]	External	65
Industrial premises	External	75

Land use	Noise assessment location	NML (LAeq,15min)[3]
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

3.4 Construction vibration criteria

3.4.1 Disturbance to building occupants

Maximum and preferred values for continuous and impulsive vibration for the M12 Central package are outlined in Table 3-5.

Table 3-5: Continuous and impulsive vibration acceleration (m/s^2) 1-80 Hz

Location	Assessment period[1]	Preferred Values		Maximum Values	
		z axis	x and y axis	z axis	x and y axis
Continuous vibration					
Critical areas[2]	Day or night-time	0.0050	0.0036	0.010	0.0072
Residences	Daytime	0.010	0.0071	0.020	0.014
	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
Residences	Daytime	0.30	0.21	0.60	0.42
	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

(2) Such as hospital operating theatres or precision laboratories.

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 M12 Central package are defined in Table 3-6.

Table 3-6: 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

(2) E.g. Operating theatres, precision laboratories and other areas where vibration sensitive activities may occur.

3.4.2 Structural damage to buildings

Cosmetic damage vibration limits for buildings and associated minimum working distances are identified in the CNVG, British Standard *BS7385 Part 2-1993 Evaluation and measurement for vibration in buildings Part 2* (BS 7385) and German Standard *DIN 4150: Part 3-2016 Structural vibration – Effects of vibration on structures* (DIN 4150-3) (DIN, 1999).

The cosmetic damage levels set by BS7385 are considered 'safe limits' up to which no damage due to vibration effects has been observed for particular building types. Table 3-7 sets out the recommended vibration limits from BS7385 for transient vibration to ensure that there is minimal risk of cosmetic damage to residential, commercial and industrial buildings, and is frequency dependent and specific to particular categories of structure.

Table 3-7: Transient vibration guide values for minimal risk of cosmetic damage

Line	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and Above
1	Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures. Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Notes: Based on BS 7385-2

3.4.3 General vibration screening criterion

The guide values in Table 3-7 relate predominantly to transient vibration which does not give rise to resonant responses in structures and low-rise buildings. Where the dynamic loading caused by continuous vibration may give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values may need to be reduced by up to 50%. Rock breaking / hammering activities are considered to have the potential to cause dynamic loading in some structures (e.g. residences) and it is therefore appropriate to reduce the transient values by 50%.

For construction activities involving intermittent vibration sources such as rock breakers, piling rigs, vibratory rollers and excavators, the predominant vibration energy occurs at frequencies greater than 4 Hz (and usually in the 10 Hz to 100 Hz range). On this basis, a conservative vibration damage screening level per receiver type is:

- Reinforced or framed structures: 25.0 mm/s
- Unreinforced or light framed structures: 7.5 mm/s.

At locations where the predicted and/or measured vibration levels are greater than shown above (peak component particle velocity) monitoring will be performed during construction. At these locations a more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure would be undertaken to determine the applicable safe vibration level.

3.4.4 Heritage buildings and items

Where structures are more sensitive such as heritage buildings and items, more stringent conditions may be applicable and will be considered on a case-by-case basis.

The 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 as shown in Table 3-8.

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

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

Notes:

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

3.4.5 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. Trigger alerts will be set where vibration monitoring in accordance with Jemena guidelines identifies vibration at 15mm/second. 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.

3.4.6 Safe working distances

Where vibration intensive plant such as rock breakers, piling rigs or vibratory rollers are used, vibration must be managed to minimise disturbance to building occupants and to avoid damage to buildings and other structures. Table 3-9 provides safe working distances as recommended by the CNVG for typical items of vibration intensive plant that must be complied with unless otherwise approved by the TfNSW ESM.

Table 3-9: Safe working distances for vibration intensive plant (CNVG)

Plant item	Rating/description	Safe working distance		
		Cosmetic damage (BS 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)	5 m	14 m	15 m to 20 m
	<100 kN (typically 2-4 t)	6 m	16 m	20 m
	<200 kN (typically 4-6 t)	12 m	33 m	40 m
	<300 kN (typically 7-13 t)	15 m	41 m	100 m
	>300 kN (typically 13-18 t)	20 m	54 m	100 m
	>300 kN (> 18 t)	25 m	68 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 3-9 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.

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.

3.5 Noise monitoring methods

The noise monitoring procedure for the M12 Central package is provided in Table 3-10. Noise monitoring will be undertaken by Seymour Whyte environmental personnel who are appropriately trained in the measurement and assessment of construction noise and vibration and have working knowledge of the requirements of AS 2659.1 and this Monitoring Program.

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 ESR (or delegate) 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 3-10: Noise monitoring procedure

Monitoring details	Frequency	Test procedure
Attended noise surveys will be carried out to verify noise environment, RBLs and NMLs	Prior to the commencement of construction	• Surveys to be carried out at the five locations identified in the Environmental Assessment Documentation relevant to the M12 Central package • Monitoring equipment is to be located at receivers which would have line-of-sight to the M12 Central package works 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 • Following review and verification, the RBLs and NMLs will be confirmed and/or modified as necessary in consultation with TfNSW.

Monitoring details	Frequency	Test procedure
Attended monitoring will be carried out at the commencement of activities for which a NVIS has been prepared to confirm the actual noise	On the first occasion of activities for which a NVIS has been prepared	The 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 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 • 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 • 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, L_{10} and L_{90} 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 3.3 and predicted noise levels. Observations will also be reported including audibility of construction noise, other noise in the environment and any discernible construction activities contributing to the noise at the receiver.
Attended OOHW noise monitoring at sensitive receivers during evening, night and OOH (weekends/ public holidays)	As required during OOHW	
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	
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)	On each occasion works undertaken in accordance with NSW CoA E36(b)(i) are carried out	
Noise monitoring at non-sensitive receivers predicted to be impacted by moderate exceedances of the NML from work in standard hours	As required	
Spot checks of noise intensive plant where it is required to check the noise emission from the plant against manufacturer’s specifications	When a noise intensive piece of equipment commences works on site	The test procedure for construction plant will be guided by the stationary test procedures according to Australian Standard AS 2012.1. • Sound level meter configured for “Fast” time weighting and “A” frequency weighting

Monitoring details	Frequency	Test procedure
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 the wind speed at the test site exceeds 5 m/s.
Real time (unattended) monitoring	As required	Refer to Section 3.5.2
Validation monitoring	At least the first two nights of OOHW	For any works that are the subject of a community agreement under the EPL or OOHW Protocol 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.

3.5.1 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 3 of the CNVMP.

3.5.2 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 in isolation.

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

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.

3.6 Vibration monitoring methods

The vibration monitoring procedure for the M12 Central package is provided in Table 3-11. Seymour Whyte environmental personnel who are appropriately trained in the measurement and assessment of construction noise and vibration and have working knowledge of the requirements of *Environmental Noise Management - Assessing Vibration: a technical guideline* (DEC, 2006) and this Monitoring Program.

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 3-11: 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: • 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 • 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 • 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 values.
Where a complaint is received in relation to human exposure to vibration levels and monitoring is considered an appropriate response	As required	
Where a complaint is received in relation to suspected property damage due to vibration impacts and monitoring is considered an appropriate response	As required	
Where an activity may occur within safe working distances for cosmetic damage for no more than one day continuously	As required	
Where required for the purposes of refining Construction methods to reduce vibration levels	As required	
Where an activity may occur within safe working distances for cosmetic damage for a period of more than one day continuously	As required	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

Monitoring details	Frequency	Test procedure
		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 have the potential to impact on heritage items	As required	• Identify minimum working distances to prevent cosmetic damage • 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	As required	• 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 necessary, additional mitigation measures will be implemented.

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 Section 3.4.6. Details of site activity and equipment usage will be noted during monitoring.

3.6.1 Vibration monitoring equipment

All monitoring will be undertaken by competent personnel, suitability trained and experienced in undertaking vibration measurements. Vibration monitoring would be undertaken using an accelerometer which meets the requirements of BS 5228 Part 2:2009 and BS7385 Part 2:1993. All vibration monitoring equipment is to be calibrated at least once every two years by an ISO 17025 accredited laboratory that holds NATA or ILAC accreditation for completion of vibration calibrations. The monitoring system will also have a measurement frequency range down to 1 Hz.

All short-term vibration monitoring will be recorded over 15-minute sample intervals. The magnitude of vibration is to be recorded at a minimum rate of 10 samples per second. The following minimum range of vibration metrics will be stored in memory and reported:

- Vibration Dose Values (VDVs)
- Root-mean-square (rms) – maximums and statistical levels
- Peak-particle velocity (ppv) – maximums and statistical levels.
- In addition to measuring and reporting overall vibration, statistical vibration will also be measured and reported in third-octave band frequencies from 1Hz to 250Hz.

The following information will be recorded within the vibration monitoring record template:

- Date and time of measurements
- Type and model number of instrumentation
- Description of the time aspects of each measurement (i.e. sample times, measurement time intervals and time of day)
- Sketch map of area
- Measurement location details and number of measurements at each location
- Operation and load conditions of the vibrating plant under investigation
- Possible vibration influences from other sources (e.g. domestic vibrations, other mechanical plant, traffic, etc.).

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.

3.7 Noise and vibration monitoring locations

The locations of noise and vibration sensitive receivers are shown in Figure 3-1. Seymour Whyte 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 this Monitoring Program.

Noise monitoring locations will include representative sensitive receivers in each relevant NCA including at least one near field and one in a setback location. 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.

4 Compliance management

4.1 Roles, responsibility and training

The organisational structure for the M12 Central package and overall roles and responsibilities are outlined in Section 5.1 of the CEMP. Specific responsibilities for the implementation of environmental controls for noise and vibration are detailed in the CNVMP.

All personnel working on site will undergo a site induction and targeted training relating to noise and vibration management issues, as detailed in the CNVMP. All personnel involved in the implementation of this Monitoring Program will receive training in the correct use of the equipment, including field maintenance, use, storage and data analysis. The ESR is responsible for training and keeping records of trained staff.

4.2 Data analysis and management response

Noise and vibration monitoring results obtained during the Monitoring Program will be compared against the performance criteria described in Sections 3.3 and 3.4, and in Section 5 of the CNVMP. If an exceedance is identified, the ESR (or delegate) will co-ordinate a management review and the appropriate responses that are triggered. The review will assess:

- Construction activities occurring at the time, including specific equipment in comparison to that assessed as part of the noise assessment and/or relevant approvals
- If any High Noise Impact Works were occurring
- Determining possible causes for the exceedance(s)
- The implementation and effectiveness of Standard and Additional mitigation measures (Section 8 of the CNVMP) in place at the time of the exceedance
- Compliance with the NVIS as relevant
- Other (non-project) activities that may influence monitoring results (unrelated works or events such as meteorological conditions etc).

If the exceedance is determined to be attributable to M12 Central package, the event will be classified as a non-conformance, incident or reportable event as defined by the M12 Environment Incident Classification and Reporting Procedure (Appendix A7 of the CEMP). The exceedance will be reported to TfNSW (PM and ESM or delegate) and the ER within seven days and managed in accordance with the requirements of the CEMP (Section 7.3 and Appendix A7), with corrective and preventative actions to be identified and implemented. These actions may include advising relevant personnel of the problem, 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. Details of exceedances will be provided in the Monthly Environmental Reports.

Where actual noise levels are found to exceed the predicted worst-case levels, the source of excessive noise will be identified, and any additional feasible and reasonable measures will be implemented to 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.

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 QA specifications and the procedure for dealing with non-compliance with environmental management measures outlined in Section 7.3 of the CEMP. The ESR will 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 in consultation with TfNSW based on the level of risk or reoccurrence of the exceedance (e.g. a significant risk will require immediate action).

4.3 Reporting

All monitoring results are to be provided to TfNSW on request, or provide access to the website portal if “real-time” monitoring is utilised.

4.3.1 Monthly Environmental Report

A Monthly Environmental Report will be prepared for the duration of the M12 Central package for submission to the TfNSW ESR (or delegate) for review and to the ER for information.

Information to be detailed in the reports includes:

- Results summary and analysis of the environmental monitoring
- Review of monitoring data against relevant noise and vibration criteria, including NMLs
- Performance of this Monitoring Program
- Summary of any complaints received that are related to noise and vibration complaints.

Refer to Section 7.5 of the CEMP for further detail on environmental reporting.

4.3.2 Construction Monitoring Report – Noise and Vibration

A quarterly Construction Monitoring Report will be prepared for the duration of the M12 Central package, detailing the results of the noise and vibration monitoring undertaken in accordance with this Monitoring Program.

Construction Monitoring Reports will include, but not be limited to:

- 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
- Review of monitoring data against the nominated noise and vibration criteria
- Identification of exceedances of the nominated criteria and descriptions of the likely causes
- Details of any alterations/deviations from the Monitoring Program

- Summary of any complaints received regarding noise and vibration.

The Construction Monitoring Report will be submitted every six months to TfNSW, the ER, the EPA and the Planning Secretary for information until construction completion.

Accurate records of all noise and vibration monitoring activities will be maintained.

4.3.3 Reporting of monitoring following complaints

Where not using “real time” monitoring, the ESR (or delegate) will undertake attended compliance noise and vibration monitoring following the receipt of a complaint and report the results of the monitoring to TfNSW as soon as possible, but in any case in less than five (5) working days. Where noise and/ or vibration exceedances are detected, procedures are to be reviewed (as per Section 4.2) in order to identify means to minimise the impacts to residents.

5 Review and improvement

5.1 Continuous improvement

Continuous improvement of this Monitoring Program 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 noise and vibration 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 non-conformances 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 ESR is responsible for ensuring stage-specific environmental risks are identified and included in the M12 Central package risk register and appropriate mitigation measures implemented throughout the construction, as part of the continuous improvement process. The process for ongoing risk identification and management during construction is outlined in Section 4.1.2 of the CEMP.

5.2 Monitoring Program update and amendment

The processes described in Section 7.7 of the CEMP may result in the need to update or revise this Monitoring Program. This will occur as needed. Any revisions to this Monitoring Program will be in accordance with the process outlined in Section 1.12 of the CEMP.

A copy of the updated Monitoring Program and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure (refer to Section 7.6.2 of the CEMP).

Appendix C

Out-of-Hours Work Procedure

M12 Motorway – Central

January 2025

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Document control

File Name	OOHW Procedure
Title	M12 Central CEMP: Appendix B2 Construction Noise and Vibration Management Sub-plan Appendix C – Out of Hours Work Procedure
Document Number (Teambinder)	M12CCO-SYW-ALL-EN-PLN-000005

Approval and authorisation

Plan reviewed by:	Plan reviewed by:
[redacted] Seymour Whyte Environmental Site Representative	[redacted] Seymour Whyte Project Manager
18/01/2025	18/01/2025
	

Revision history

Revision	Date	Description
A	18/02/2022	First draft for TfNSW review
B	29/04/2022	Updated in response to TfNSW review
C	27/06/2022	Updated in response to TfNSW review
D	27/06/2022	Updated in response to TfNSW and ER review
E	26/05/2023	Updated to reflect changes in accordance with RFI 383 and OCEMP
F	18/07/2023	Updated in response to OCEMP update
G	18/01/2025	Update in response to OCEMP update

Contents

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
Approved standard hours	Hours during which construction work is permitted by the NSW CoA
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
AVTG	Assessing Vibration – a technical guideline (DEC 2006)
CMS	Complaints Management System
CNVMP	Construction Noise and Vibration Management Plan
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 OCEMP, works approved under a Site Establishment Management Plan, demolition of acquired residential houses, structures and sheds, and works specified in Appendix B of the Infrastructure Approval 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' sub-contractors.
CSSI	Critical State Significant Infrastructure
DAWE	Former Commonwealth Department of the Water, Agriculture and Environment (now Department of Climate Change, Energy, Environment and Water)
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

Abbreviations	Expanded Text
DCCEEW	Commonwealth Department of Climate Change, Energy, Environment and Water
DEC	Former Department of Environment and Conservation (now Environment and Heritage Group (EHG) (a part of NSW DPE)
DECC	Former Commonwealth Department of Environment and Climate Change (now DCCEEW)
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)
DPIE	Former Department of Planning, Industry and Environment, now Department of Planning and Environment)
DR	Duration Respites
EES	Former Environmental, Energy and Science
EHG	Environment and Heritage Group (a part of NSW DPE)
EIS	Environmental Impact Statement
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) • Arcadis (rSeptember, 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 at 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 – East Site 48, 50 and 51 Boundary Changes Minor Consistency Assessment • Arcadis (January, 2024) M12 Motorway – Minor Consistency Assessment M12 Central Water Tower Access Road The documents that comprise the EPBC referral:

Abbreviations	Expanded Text
	• 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.
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	TfNSW Environment and Sustainability Manager
ESR	Environmental Site Representative (Seymour Whyte)
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.
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.
IB	Individual briefing
ICNG	Interim Construction Noise Guideline (DECC 2009)

Abbreviations	Expanded Text
Infrastructure Approval	Approval (SSI 9364) for carrying out of the M12 Project under Section 5.19 of the *Environmental Planning and Assessment Act 1979* 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
OCEMP	Overarching Construction Environmental Management Plan
OCNVMP	Overarching Construction Noise and Vibration Management Sub-plan
OCS	Overarching Communication Strategy
OEH	Office of Environment and Heritage, now EHG
OOH	Out-of-Hours
OOHW	Out-of-Hours Works – work completed outside of approved standard hours
Planning Secretary	Secretary of the NSW Department of Infrastructure, Planning and Environment, or delegate
Primary CoA/REMM	CoA/REMM that are specific to the development of this Plan
Project, the	The CSSI as approved by the Minister for Planning and Public Spaces on the 23 April 2021 (SSI 9364)
QA	Quality Assurance

Abbreviations	Expanded Text
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 TfNSW QA specification G1
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

1 Introduction

1.1 Context

This Out-Of-Hours Work (OOHW) Procedure is an appendix of the Construction Noise and Vibration Management Sub-plan (CNVMP) which forms part of the Construction Environmental Management Plan (CEMP) for the M12 Motorway – Central package.

This OOHW Procedure has been prepared under the Overarching Construction Environmental Management Plan (OCEMP) and relevant sub-plans developed for M12 Motorway (the Project), to address the requirements of the Minister's Conditions of Approval (CoA), Revised Environmental Management Measures (REMMs) listed in the Environmental Impact Statement (EIS), Submissions Report, Amendment Report, and Amendment Report Submissions Report (ARSR), ARSR Amendment Report, all applicable legislation, the Environment Protection Licence (EPL) issued for M12 Central package and Transport for New South Wales (TfNSW) specifications.

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 Sitesd 48, 50 and 51 Boundary Changes 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.

1.2 Background

1.2.1 M12 Motorway (the Project)

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. A detailed Project description is provided in Section 2.1 of the CEMP.

1.2.2 M12 Central

Seymour Whyte has been engaged to deliver the M12 Central package. Construction of the M12 Central package involves building 7.5 km of motorway from west of Badgerys Creek to the Water Tower Access Road within Western Sydney Parklands. A detailed description of the M12 Central package is provided in Section 2.3 of the CEMP.

1.3 Scope of the OOHW Procedure

This Out-Of-Hours Work (OOHW) Procedure has been developed to manage any work associated with construction of the M12 Central package that will be carried outside the standard construction hours, and subject to the Environment Protection Licence (No. 21596) (EPL). This Procedure describes how to ensure compliance with the EPL and has been developed under and consistent with TfNSW QA specification G1, and as relevant, the OCEMP, and in particular the OOHW Protocol which forms part of the Overarching Construction Noise and Vibration Management Sub-Plan (OCNVMP), considering relevant sensitive receivers and construction activities. For OOHW, not subject to an EPL, works will be undertaken consistent with the requirements of the OOHW Protocol which forms part of the OCNVMP.

This OOHW Procedure has been developed in accordance with the EPL and NSW CoA E36(c)(i), and is to be read in conjunction with the Construction Noise and Vibration Guideline (Roads and Maritime, 2016) (CNVG) and OOHW Protocol. This OOHW Procedure forms part of the

Construction Noise and Vibration Management Sub-Plan (CNVMP) for the M12 Central package, and has been prepared in consultation with the independent Environmental Representative (ER). A copy of this OOHW Procedure will be kept on the premises for the duration of construction.

1.4 Environmental Management Systems overview

This OOHW Procedure forms part of the environmental management framework for the M12 Central package, as described in Section 3.3 of the CEMP. This OOHW Procedure is to be used in conjunction with the CNVG , the CNVMP, Noise and Vibration Impact Statements (NVIS), and the EPL. These documents establish minimum requirements for managing noise and vibration impacts on the M12 Central package. All construction noise and vibration documentation including NVIS that discuss OOHW must be aligned and consistent with this OOHW Procedure.

1.4.1 TfNSW Construction Noise and Vibration Guideline

The M12 Central package will be implemented in accordance with the TfNSW Construction Noise and Vibration Guideline (Roads and Maritime, 2016) (CNVG). Relevant cross references to the CNVG occur through this document to avoid duplication.

The CNVG is available at: Construction noise and vibration guideline (nsw.gov.au)

Some discrepancies between the Infrastructure Approval (SSI 9364) and CNVG exist. This OOHW Procedure, which specifically aligns to the project-specific Conditions of Approval, takes precedence over the CNVG where inconsistencies occur.

All relevant Standard and Additional Mitigation Measures of the CNVG will apply to OOHW to minimise impacts to the local community and stakeholders, which are identified within Appendix A and Appendix B of the CNVG . Additional Mitigation Measures that specifically relate to OOHW and residual impacts are described in Section 7 of this OOHW Procedure.

1.4.2 Construction Noise and Vibration Management Plan

The CNVMP provides specific mitigation and management measures to minimise potential noise and vibration impacts during works outside of standard hours. The CNVMP includes a Noise and Vibration Monitoring Program which outlines how noise and vibration monitoring will be carried out, how the results of monitoring will be reported and procedures to identify and implement additional mitigation measures as necessary.

1.4.3 Noise and Vibration Impact Statement(s)

A Noise and Vibration Impact Statement (CNVIS) is a location and activity specific document that provides an assessment of the anticipated noise and vibration impacts of construction at sensitive receivers. In accordance with NSW CoA E40, a NVIS is to be prepared for any work that may exceed the noise management levels and vibration criteria specific in NSW CoA E38 (Section 5 of the CNVMP) at any residence outside the approved standard hours, or where receiver will be highly noise affected, i.e. noise levels above 75dB(A).

During development of an NVIS to support proposed works, consideration of the assessment steps provided in Sections 5, 6 and 7 of the CNVG , including the identification of all applicable mitigation measures such as those required by the NSW CoA, REMMMs, and the Standard and Additional Mitigation Measures outlined in Appendix A and B of the CNVG . The aim of this assessment is to minimise the impact of noise and vibration on sensitive receivers because of OOHW. It is noted that applied Standard and Additional Mitigation Measures may be modified as a result of community consultation outcomes and detailed in the OOHW approval request (see Section 8 for more details). 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.

1.4.4 Environment Protection Licence

An EPL is a regulatory approval issued to strategically control the localised, cumulative and acute impacts of pollution. The NSW Environment Protection Authority (EPA) is responsible for issuing EPLs for 'scheduled activities' under the *Protection of the Environment Operations (POEO) Act 1997* (NSW). An EPL has been obtained for the M12 Central package under Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act) for 'road construction'.

The process for approving OOHW outside of those already permitted in accordance with an EPL, is governed by the conditions of the EPL. For these types of OOHW to be approved, an application to vary the EPL is to be prepared and submitted to the EPA for approval. The Environmental Site Representative (ESR) is responsible for preparing the EPL variations and the application is to be in accordance with the CNVG and EPL requirements.

OOHW that are subject to an EPL are permitted in accordance with NSW CoA E36(c)(i) of the Infrastructure Approval, and therefore do not require approval by the Secretary.

1.5 Approval, review and modification

This OOHW Procedure will be reviewed by the TfNSW Environment and Sustainability Manager (ESM) (or delegate) and the ER to confirm it is generally consistent with, and incorporates, all relevant elements of the approved OCEMP and other requirements, prior to submission to the EPA. Works outside of the standard construction hours will not commence on the M12 Central package until this OOHW Procedure is approved by the ER and issued to the EPA. The OOHW Procedure will be implemented for the duration of construction.

Any amendments to the OOHW Procedure will be documented in subsequent revisions of this OOHW Procedure. A copy of the updated OOHW Procedure and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure outlined in the CEMP. Site personnel with responsibilities relevant to out of hours works will be informed of any amendments to the OOHW Procedure and training provided, where required.

2 Hours of work

2.1 Standard Hours of Works

In accordance with TfNSW QA specification G1, the contractual working days and nights of work 'standard construction hours' for the M12 Central package are between 7:00 am to 6:00 pm Monday to Friday inclusive but excluding public holidays and rostered days off.

In accordance with EPL condition L5.1 and NSW CoA E34, the 'approved standard hours' are:

- Monday to Friday: 7:00 am to 6:00 pm
- Saturday: 8:00 am to 6:00 pm
- Sundays and public holidays: no work.

TfNSW are to be notified of any work to be undertaken between 8:00am and 6:00pm on Saturdays (the allowable work hours on Saturdays identified in the Infrastructure Approval) and must be notified no later than 12:00 pm on the Thursday immediately prior to the Saturday proposed to undertake work. This notification will typically occur through TfNSW's review and approval of draft community notifications.

These hours take precedent from the standard construction hours identified in CNVG . There are exemptions to these standard hours of work as outlined in Section 3.1.

2.2 Out of Hours Works Periods

Certain activities may need to be carried out outside of approved standard hours where the requirements of the NSW CoA are satisfied. OOHW can be divided into two periods of sensitivity:

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

Standard hours of work for construction of the M12 Central package are summarised in Table 2-1. Note that this does not include Highly Noise Intensive Works which are subject to additional restrictions as described in Section 2.3.

TfNSW are to be notified of Approved OOHW to be undertaken (see Section 3.3). The notification to TfNSW will typically occur through TfNSW's review and approval of draft community notifications. The ER is to be provided with a copy of community notifications if requested.

Table 2-1: Construction Hours

Hour commencing	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Monday																								
Tuesday																								
Wednesday																								
Thursday																								
Friday																								
Saturday																								
Sunday																								
Public Holiday																								

OOHW Period 2 | Standard Construction Hours (and Approved Construction Hours) | **OOHW Period 1 Evening** | Approved Standard Hours (TfNSW notification required) | **OOHW Period 1 Day** | **OOHW Period 2**

2.3 Highly Noise Intensive Works

In accordance with EPL condition L5.2 and NSW CoA E35, highly noise intensive works 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, and the location of the works means that it is likely to impact the same receivers, then not exceeding three hours, with a minimum cessation of work of not less than one hour.

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

Highly Noise Intensive Work is only permitted outside of these hours by an EPL and this OOHW Procedure. No blasting activities are permitted under the EPL or Infrastructure Approval.

The definition of Highly Noise Intensive Work (or High Noise Impact Activities and Work) is provided in Table 1 in the Infrastructure Approval, being any 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.

It also includes any other activity identified by the EPA, following an assessment of the character of the noise emitted by an activity based on the Noise Policy for Industry, Factsheet C considerations (EPA, 2017).

Highly Noise Intensive Work is to be considered as part of noise assessments used to determine the risk level. These activities will not always be considered 'high risk', but if the noise from a particular plant item is considered Highly Noise Intensive Work a five (5) dBA penalty is to be added to the noise source sound power level in the noise assessment. The noise assessment will determine the likely impact to sensitive receivers and inform the corresponding risk level.

For OOHW subject to this OOHW Procedure that involves the use of Highly Noise Intensive Work, Seymour Whyte will consider, wherever reasonable and feasible:

- Use of alternative quieter plant and equipment
- Planning works during less noise sensitive periods (e.g. try and complete highly noise intensive works as early in the night as possible)
- Schedule highly noise intensive equipment prior to 10 pm and/or midnight.

Note – there may be instances where Highly Noise Intensive Work will be required after 10 pm and/or midnight as outlined above. Examples where this might occur include specific conditions detailed in the Road Occupancy License (ROL), reinstating trafficable areas using whacker packers and asphalting plant at the end of applicable shifts.

For Highly Noise Intensive Work carried out under the EPL during out of hours, note that:

- The respite provisions as per the requirements of EPL condition L5.2(c) do not apply provided that all Highly Noise Intensive Work is undertaken prior to 12:00 am (midnight)
- Where Highly Noise Intensive Work is undertaken after 12:00 am (midnight), the respite provisions in EPL condition L5.2(c) apply.

High vibration impact is defined as any work that will exceed the human comfort vibration criteria provided in Section 5 of the CNVMP.

3 Out of Hours Works

Notwithstanding the standard construction hours and additional restrictions on Highly Noise Intensive Works, work may be undertaken outside of the hours specified in TfNSW QA specification G1, where it is required for safety reasons or in the event of an emergency, where it is low impact, or where it is undertaken by approval or agreement, as described in this section.

3.1 Application to work on Saturdays (approved standard hours)

In accordance with TfNSW QA specification G1, the contractual working days and nights of work 'standard construction hours' for the M12 Central package are between 7:00 am to 6:00 pm Monday to Friday inclusive but excluding public holidays and rostered days off. However in accordance with EPL condition L5.1 and NSW CoA E34, the approved construction hours also include 8:00 am to 6:00 pm Saturday.

Seymour Whyte must submit a request to TfNSW to work outside of the contractual working hours in TfNSW QA specification G1. Any application for OOHW is to demonstrate that the proposed OOHW is compliant with the relevant CoA and EPL conditions. The TfNSW contract manager (or delegated person) would forward the relevant OOHW application to the TfNSW Environment team, TfNSW Comms and ER for information and comment. The TfNSW contract manager (or delegated person) approves the OOHW in accordance with G1 based on advice from TfNSW Environment team, TfNSW Comms and the ER.

TfNSW are to be notified of any work to be undertaken between 8:00am and 6:00pm on Saturdays (the allowable work hours on Saturdays identified in the Infrastructure Approval) and must be notified no later than 12:00 pm on the Thursday immediately prior to the Saturday proposed to undertake work. This notification will typically occur through TfNSW's review and approval of draft community notifications.

3.2 Exemptions to standard working hours

There are a number of exemptions, where works are approved to occur outside of the approved standard hours (as identified in Section 2.1) if one or more of the following circumstances are triggered, as permitted by EPL condition L5.3, EPL condition L5.4, and NSW CoA E36(a) and (b). For works subject to these exemptions, the requirements of NSW CoA E37 do not apply.

3.2.1 Safety and emergency

OOHW may be undertaken for safety reasons or in the event of an emergency, including:

- For the delivery of materials required by the NSW Police Force or other authority for safety reasons
- Where it is required in an emergency (Emergency Works) to avoid injury or the loss of life, to avoid damage or loss of property, or to prevent environmental harm.

In the event of Emergency Works, notification procedures in Section 5.4 are to be implemented.

3.2.2 Low impact out of hours works

Low impact OOHW may be undertaken outside of the approved standard hours. Low impact OOHW, includes all work activities 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).

Adequate assessment of work activities is required to demonstrate that the proposed works are low impact. An OOHW Permit (Attachment 1) is to be used to demonstrate compliance. Evidence of these assessments and/or the OOHW Permit is to be provided to TfNSW and ER prior to the works or as soon as practicable.

3.3 Approved OOHW

In addition to the exemptions to standard working hours, OOHW may be carried out where it is subject to an approval in accordance with NSW CoA E36(c), including:

- Where different construction hours are permitted or required under an EPL in force in respect of the CSSI (see Section 3.3.1); 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 (see Section 3.3.2); or
- Where negotiated agreements with directly affected residents and sensitive land uses have been reached (see Section 3.3.3).

Adequate justification of the need for OOHW is required to be developed in accordance with the CNVG , ICNG and EPL, or where OOHW is required, such as:

- For technical considerations (such as the need to meet particular quality specifications)
- To maintain the safety of road users or construction personnel
- Where a road occupancy license will not be provided during standard times
- For delivery of materials for safety reasons
- 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.

3.3.1 Approved by an EPL

The vast majority of out of hours works on the M12 Central package will be undertaken subject to the EPL. Where undertaking works under the EPL, works must be undertaken in accordance with the EPL conditions. The OOHW Permit (Attachment 1) is to be used to confirm compliance with EPL conditions. The ESR (or delegate) is responsible for the approval of all OOHW Permits. A copy of an OOHW Permit is to be provided to TfNSW and ER prior to the works or as soon as practicable.

An EPL holder can apply to vary the conditions of the licence. The application form for this purpose is available from the EPA. The EPA may also vary the conditions of the EPL at any time by written notice without an application being made. Where a licence has been granted in relation to development which was assessed under the EP&A Act in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

The ESR will be responsible for the preparation of EPL variations seeking approval to undertake works outside of the approved standard hours which are managed in accordance with the EPL.

As part of the noise and vibration assessment process, Seymour Whyte will ensure all OOHW permitted by either the EPL or the OOHW protocol (see Section 3.3.2); are co-ordinated ensure cumulative impacts are considered and that appropriate respite and/or mitigation measures for potentially affected sensitive receivers are implemented.

3.3.2 Approved by the OOHW Protocol (for works not subject to the EPL)

The vast majority of works on the M12 Central package will be undertaken subject to the EPL. However there may instances where Seymour Whyte are required to work outside of the EPL requirements. Typically, OOHW that is not subject to an EPL will involve service investigations, relocations and other works items that are not scheduled activities under the POEO Act (and associated regulations) and are outside the EPL premise boundary. These instances are to be discussed with TfNSW and the EPA to confirm compliance with the EPL requirements.

For the approval of OOHW not subject to the EPL, the procedures outlined in the OOHW Protocol, part of the OCEMP, are to be complied with. An assessment of risk factors is required to determine the approval pathway for these works. For Low-Risk activities the ER is the relevant approval authority. For High-Risk activities, the Planning Secretary (or delegate) is the relevant approval authority. Where the ER determines that the work activity is High-Risk, approval for the out of hours works through this pathway must be submitted to the Planning Secretary for approval.

3.3.3 Approved by Community Agreement

OOHW may be undertaken where a Community Agreement between Seymour Whyte and a substantial majority of the affected noise sensitive receivers has been reached in consideration of the requirements of EPL condition E1 and NSW CoA's E39, E46 and E47, and approval received through the process outlined in Section 8. Any Community Agreement to permit works to be undertaken outside of the approved standard hours must:

a) Be prepared in writing and implemented in accordance with the relevant sections of the TfNSW CNVG , ICNG, Noise Policy for Industry (EPA, 2017) and AS2346-2010 *"Guide to noise and vibration control on construction, demolition and maintenance sites"*;

b) Detail the following:

i) the actual works proposed

ii) any expected impacts in clear, simple English based on noise modelling

iii) the expected duration of the works

iv) any expected benefits for receivers

v) any other concurrent OOHW that will be occurring as a result of other Project activities

vi) any other OOHW as a result of Project activities that will be occurring on the nights preceding and following the proposed works or, if the proposed work precedes or follows a weekend period, any other OOHW that will be occurring on the weekend.

c) Demonstrate that the noise sensitive receivers party to the Community Agreement understand the nature of the works and any predicted impacts

d) For any Community Agreement that is longer than 21 calendar days, demonstrate that the community has been consulted in relation to re-engagement periods for the purpose of determining agreement from the community is maintained and continuing

e) Community Agreements will be used to support an OOHW approval request where they are intended to be used to provide justification for OOHW with approval for implementation sought through the process outlined in Section 8

f) Be kept for the duration of the Community Agreement and made available to TfNSW, the ER EPA and the Planning Secretary on request

g) Undertake community notification as required by Section 6.

In relation to consulting and engaging with noise sensitive receivers for a Community Agreement, the following applies:

a) All noise sensitive receivers predicted by modelling to be impacted by noise greater than 5 dB(A) above RBL must be consulted on any proposed Community Agreement. This includes noise sensitive receivers that have declined to participate in previous agreements

b) All proposed agreements must include details for interpreting services for languages other than English where required

c) If the Seymour Whyte is unable to contact a noise sensitive receiver after three attempts, including leaving "sorry I missed you" cards explaining the reason for the visit and requesting a return phone call, then it will be noted that the receiver could not be contacted and the receiver will not be considered to have either agreed or disagreed

d) Records of the attempts to contact the receiver will be kept by on file.

Agreement Thresholds

The following agreement thresholds will be observed when considering if a substantial majority of the affected community have agreed to OOHW (note both apply):

a) Noise sensitive receivers predicted to be impacted by noise levels exceeding those specified in Section 3.2.2 of this OOHW Procedure

b) Noise sensitive receivers predicted to be impacted by noise levels above a highly noise affected level of 75dB(A).

The agreement threshold will be determined by the EPA and no set threshold has been set in the EPL

Agreements by Phone

Where a Community Agreement has been reached with noise sensitive receivers over the phone, the following applies:

a) The phone script used to describe the proposed agreement (including information required under EPL condition E1.3 and NSW CoA E47 is to be provided to EPA or Planning Secretary with the Community Agreement for approval

b) The script must include a clear question requesting receiver agreement to the proposal

c) Detailed records are to be maintained of all Community Agreement phone conversations and must be maintained for the duration of the Community Agreement

d) Any noise sensitive receiver who requests a copy of the phone agreement must be supplied with one.

Notification

All noise sensitive receivers must be advised of any Community Agreement that has been attained in writing within seven calendar days of the agreement being finalised and must:

a) Include a website link to the project website, specifically to a summary of the approved project agreement

b) Include details of the Project 24-hour complaints line.

The notification requirements in Section 6 also apply to Community Agreements and must comply with the OCS.

Noise Monitoring

A noise validation monitoring plan must be submitted to the EPA for approval as part of the Community Agreement documentation prior to any OOHW occurring.

In accordance with EPL condition E1.8, validation monitoring must be undertaken for any works that are the subject of the Community Agreement and must:

a) Be performed by a suitably qualified and experienced person

b) Be performed on at least the first 2 nights where OOHW will be undertaken

c) Be performed on any other night where the nature of the works is likely to cause greater noise impacts than the first 2 nights

d) Be representative of the impacts

e) Be undertaken in accordance with the validation monitoring plan prepared under EPL condition E1.7 for the works that are the subject of the Community Agreement

f) Be recorded and provided to an EPA officer upon request.

If validation monitoring undertaken under EPL condition E1.8 shows that noise levels are higher than those predicted by any noise modelling undertaken as part of the Community Agreement, work practices must be modified immediately so that measured noise levels do not exceed predicted levels.

Where it has been determined that works cannot be modified to achieve the predicted noise levels:

a) the licensee must report immediately to the EPA; and

b) the EPA may terminate the community agreement.

Ongoing community engagement and agreement

For any community agreement longer than 21 calendar days to remain valid, it must be demonstrated that agreement from the community is maintained and continuing. To demonstrate that the agreement from the community is maintained and continuing Seymour Whyte must:

a) Engage the community to determine if a substantial majority of noise sensitive receivers continue to support the agreement pursuant to the re-engagement period determined under EPL condition E1.3(d)

b) Provide the EPA with a report within seven (7) calendar days of the end of each re-engagement period summarising the community response and comparing community agreement rates against previous community agreement rates.

Where Seymour Whyte is unable to demonstrate a substantial majority of agreement from the community is maintained and continuing the ESR must report immediately to the EPA; and the EPA may terminate the Community Agreement.

4 Assessment of risk factors

4.1 Noise assessments

A quantitative noise assessment is to be developed in accordance with the NSW CoA, the CNVG , EPL, this OOHW Procedure and the Interim Construction Noise Guideline (DEC, 2009) and will:

- Describe the works/activities proposed outside of the approved standard hours
- Identify the exceedances of construction scenarios against the NMLs adopted for each Noise Catchment Area (NCA) or other sensitive land uses (see Section 5 of the CNVMP)
- Determine the extent of noise impacts the construction activities will have on sensitive receivers, including predicted noise levels[1], frequency and duration of OOHW, awakening events/sleep disturbance
- Determine the appropriate standard and additional mitigation measures
- Consider if feasible and reasonable work practices have been identified to minimise the noise. See Section 1.4.3 for details on NVIS
- Provide a monitoring plan to validate the noise predictions, based on monitoring at the boundary of representative sensitive receivers during noise generating activities that are representative of the works and activities, including during the period/s predicted to have the highest noise level impacts.

4.2 Vibration assessments

An assessment will be required for vibration intensive OOHW within the safe working distances for human comfort (refer to Section 5 of the CNVMP) 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.

[1] Provide predictions of LAeq (15 minute) dB noise levels at noise sensitive receivers from these works and activities, where noise levels are predicted to be greater than those permitted under EPL condition L5.3

5 Scheduling Works and Respite

5.1 Hierarchy of Preferred Working Hours

Where work outside of the standard construction hours is planned to take place the following hierarchy of preferred working hours must be considered when timetabling works unless otherwise agreed with affected community through consultation (Section 6.1).

1. Saturday morning periods between 8am and 1pm (approved standard hours)
2. Saturday afternoon periods between 1pm and 6pm (Daytime OOH, also applicable to HNIW)
3. Sunday and public holiday day periods between 8am and 6pm (Period 1 Day)
4. Weekday evening periods between 6pm and 10pm (Period 1 Evening)
5. Weekend evening periods between 6pm and 10pm (Saturdays Period 1 Evening/Sundays Period 2)
6. Weekend night periods between 10pm and 8am (Period 2)
7. Work during the weekday evening and night and scheduling the noisiest or vibration intensive work first (between 6pm and 10pm) to minimise sleep disturbance impacts in the night period between 10pm and 7am) (Period 1 Evening & Period 2)
8. All other times outside recommended standard hours.

This hierarchy does not apply to Emergency Work. This hierarchy is also provided in Section 5.3.4 of the CNVMP.

5.2 Road Traffic Noise

When planning OOHW, consideration must be given to minimising road traffic noise caused by construction of M12 Central package, including but not limited to:

- Restricting heavy vehicle movements to standard hours; and/or
- Planning heavy vehicle haulage routes that have fewer sensitive receivers.

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

Where noise levels increase by more than 2 dB (i.e. 2.1 dB or greater) further assessment is required using the criteria presented in the RNP.

5.3 Co-ordination of OOHW with third parties

All OOHW, including works undertaken by a third party, will be co-ordinated with other Project packages, and 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 receivers in consultation with managers of other nearby projects that are likely to result in a cumulative impact. This will include:

- Coordination between Project packages, and other projects
- 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).

5.4 Emergency Works

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

- An emergency (i.e. an unforeseen occurrence; a sudden and urgent occasion for action); and
- Required to avoid injury, loss of life, damage or loss of property or prevent environmental harm.

On becoming aware of the need for Emergency Works in accordance with EPL condition L5.4 and NSW CoA E36(a)(ii), TfNSW, the ER, the EPA and the Planning Secretary must be notified, including the reasons for such emergency work. The EPA's Environment Line must be notified as soon as practicable.

As a form of mitigation, the construction team will use best endeavours to notify all affected sensitive receivers of the likely impact and duration of the Emergency Works. These notifications will generally be prepared using a small hand-completed information card for distribution to properties immediately adjacent to or impacted by the Emergency Works. These cards should include the following details as a minimum:

- Scope
- Location
- Hours
- Duration
- Types of equipment to be used
- Likely impacts
- Project 24-hour Telephone Contact Number, postal address and email address.

On the next business day after the Emergency Works commenced, a written Emergency Works report is to be prepared and submitted to TfNSW, ER and to the EPA (by 2:00 pm), including as a minimum:

- Date, time, duration and cause of the emergency
- Description of emergency works undertaken
- Mitigation measures implemented to address the impacts of the emergency works

- Actions/Measures taken or to be taken to prevent or mitigate recurrence of the emergency. If there are no appropriate actions/measures, explanation is to be provided as to why.
- Review of programmed works schedule following an occurrence of Emergency Works with the aim of achieving the required respite requirements.

6 Consultation

6.1 Community Consultation

In order to undertake works outside the hours specified under EPL condition L5.1 / NSW CoA E34, appropriate respite periods for the OOHW must be determined in consultation with the community at each affected location on a regular basis.

Appropriate work and respite periods must be identified in consultation with the community at three monthly intervals (at a minimum). NSW CoA E47 requires that 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

d) Likely mitigation and management measures which aim to achieve the relevant noise management levels and vibration criteria under NSW CoA 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).

Consultation mechanisms will be consistent with those nominated in the OCS and CSEP, and tailored to the affected community as advised by the Seymour Whyte Community Relations Manager, in conjunction with TfNSW.

A variety of communication and engagement tools and techniques are required to achieve adequate engagement objectives. These tools include (but are not limited to) a project website, a 24 hour toll-free project information line, information brochures, fact sheets, face-to-face interaction and community information sessions, and will be used to achieve the consultation outcomes required for NSW CoA E47 and to inform respite preferences. The OCS identifies additional consultation required for out-of-hours work and noisy work.

Where additional mitigation measures are proposed, the Seymour Whyte Community Relations Manager 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 Permit.

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 TfNSW ESM (or delegate), TfNSW Project Manager, ER, EPA and the Planning Secretary for information prior to work scheduled for the subject period being undertaken.

6.2 Community Notification

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

In accordance with EPL condition L5.7, affected noise sensitive receivers must be notified of works outside of the approved standard hours not less than five (5) calendar days and not more than 14 calendar days before those works are to be undertaken. Further details on community notification requirements are outlined in the CNVG , OCS and CSEP. Community notifications are to be implemented in accordance with these documents.

7 Determining mitigation

7.1 Standard Mitigation Measures

The CNVMP Section 8.5 includes the standard mitigation and management measures that apply to works undertaken for the M12 Central package, with reference to the CNVG, the ICNG and in accordance with the Infrastructure Approval. These standard mitigation measures apply to all works and will be implemented as appropriate.

7.2 Additional Mitigation Measures

Additional mitigation measures specifically relating to OOHW and residual impacts are outlined in Table 7-1. Details of how these additional mitigation measures will apply to a specific activity will be outlined in the OOHW approval request and associated documents.

Table 7-1: Additional mitigation measures

Action required	Applies to	Details
Periodic Notification	All OOHW	Stakeholder consultation to be completed in compliance with the OCS and as noted in Section 6 of this OOHW Procedure.
Specific Notification	OOHW causing: • Airborne noise • Ground-borne noise & vibration Where triggered by Table C.1 of CNVG	Stakeholder consultation to be completed in compliance with the OCS and as noted in Section 6 of this OOHW Procedure.

Action required	Applies to	Details
Verification Monitoring	OOHW causing: • Airborne noise • Ground-borne noise & vibration Where triggered by Table C.1 of CNVG or as requested by the ER	Verification monitoring of noise and/or vibration during construction may be conducted at the affected receiver(s) or a nominated representative location (typically the nearest receiver where more than one receiver has been identified). Monitoring can be in the form of either unattended logging (i.e. for vibration provided there is an immediate feedback mechanism such as SMS capabilities) or operator attended surveys (i.e. for specific periods of construction noise). The purpose of monitoring is to confirm that: • Construction noise and vibration from the project are consistent with the predictions in the noise assessment; and/or • Identifying actual impacts of activities on sensitive receivers, such as: ◦ noise levels after implementation of noise reducing mitigation (mufflers, baffles, screens). ◦ vibration during construction in close proximity to structures; and/or • Mitigation and management of construction noise and vibration is appropriate for receivers affected by the works Where noise monitoring finds that the actual noise levels exceed those predicted in the noise assessment then immediate refinement of mitigation measures may be required and the CNVIS amended. Refer to Appendix F of the CNVG for more details.
Respite Offer	OOHW causing: • Airborne noise • Ground-borne noise & vibration Where triggered by Table C.1 of CNVG or as requested by the ER	The purpose of a project specific respite offer is to provide residents subjected to lengthy periods of noise or vibration respite from an ongoing impact. The offer could comprise pre-purchased movie tickets, bowling activities, meal vouchers or similar offer. This measure is determined on a case-by-case basis.
Phone calls	OOHW causing: • Airborne noise • Ground-borne noise & vibration Where triggered by Table C.1 of CNVG or as requested by the ER	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. Stakeholder consultation to be completed in compliance with the OCS and as noted in Section 6 of this OOHW Procedure.

Action required	Applies to	Details
Individual briefings	OOHW causing: • Airborne noise • Ground-borne noise & vibration Where triggered by Table C.1 of CNVG or as requested by the ER	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 Table C.1 of the CNVG and the mitigation measures that will be implemented for the work. The Stakeholder and Engagement Manager will identify the relevant sensitive receivers through the noise and vibration impact assessment and visit identified stakeholders as part of the planning for the OOHW 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 works. Where the resident cannot be met with individually, then an alternative form of engagement will be used. Stakeholder consultation to be completed in compliance with the OCS and as noted in Section 6 of this OOHW Procedure.
Alternative Accommodation or other agreed mitigation measures	OOHW causing: • Airborne noise • Ground-borne noise & vibration Where triggered by Table C.1 of CNVG or as requested by the ER	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 2, i.e. 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.

Action required	Applies to	Details
Respite Periods	OOHW causing: • Airborne noise • Ground-borne noise & vibration Where triggered by Table C.1 of CNVG or as requested by the ER	All work will be scheduled to enable respite periods. The construction team 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. 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. Works that generate noise up to the "Clearly Audible" OOHW classification as outlined in Section 8.6 of the CNVMP, is to be no more than the following durations, as experienced by the same noise sensitive receiver (unless otherwise permitted through a separate approval, e.g. Duration Respite): • Two (2) consecutive evenings and/or nights at any time • Three (3) evenings and/or nights per week • 10 evenings and/or nights per month. Where possible, Highly Noise Intensive Works shall be completed before 10pm.
Duration Respite	OOHW causing: • Airborne noise • Ground-borne noise & vibration Where triggered by Table C.1 of CNVG or as requested by the ER	Where Respite Periods (see management measure above) are considered to be counterproductive to reducing noise and vibration impacts to the community it may be beneficial to increase the number of consecutive evenings and/or nights through Duration Respite to minimise the duration of the activity. This measure is determined on a case-by case basis and will only be implemented through the Community Agreement processes outlined in Section 3.3.3. Evidence of community support for Duration Respite must be provided as justification for the Duration Respite as part of an OOHW approval request if it is to be used as a mitigation strategy. A community engagement strategy must be agreed with and implemented in compliance with the OCS.

The additional management measures in Table 7-1 may become less effective over time. At-receiver noise mitigation may be considered where feasible and reasonable, where all options for at-source noise mitigation and management measures have been exhausted. At-receiver mitigation may include temporary window and door screens, temporary localised shielding or other permanent forms of mitigation.

Feasible and reasonable considerations for providing at-receiver treatments should include: Time of day where construction noise exceeds the NML; Time of use of affected receivers; Amount construction noise exceeds the NML; How long the mitigation will provide benefit to the receiver during the project; Optimal design of acoustic sheds and noise barriers/hoardings.

Where additional mitigation measures are proposed, consultation would be carried out by the Seymour Whyte Community Relations Manager (or delegate) in conjunction with TfNSW with affected sensitive receivers to ensure that their personal circumstances have been taken into consideration to identify the most appropriate mitigation measures. This must be done as part of the OOHW Permit.

8 Approval of Out of Hours Works

The following approval process will be followed for proposed out of hours works subject to an EPL:

1) The M12 Central OOHW Permit (Attachment 1) will be commenced by relevant Seymour Whyte staff and submitted to the ESR for review.
2) NVIS to be developed as required including identify controls, scheduling etc and determining standard, specific and additional mitigation measures.
3) The OOHW Permit (Attachment 1) will be finalised by the ESR (or delegate) and include information on:
    - Activities
    - Required plant and equipment
    - Location
    - Duration
    - Justification for the work
    - Scheduling of works in accordance with Section 5 of this OOHW Procedure
    - Details of consultation with the community regarding respite periods and scheduling as outlined in Section 6 of this OOHW Procedure
    - Details of the completed quantitative noise and vibration assessment (see Sections 4.1 and 4.2) including predicted impacts and appropriate management measures in accordance with Section 7 of this OOHW Procedure.
4) The Seymour Whyte Community Relations Manager will develop a community notification required for the OOHW and submit to TfNSW for approval in accordance with the CSEP and OCS.
5) Following endorsement of each OOHW request by the ESR, and approval of the notification by TfNSW, community consultation and notification in accordance with Section 6 of this OOHW Procedure will be undertaken.
6) Where works are being approved through a Community Agreement (see Section 3.3.3), the Community Agreement must be submitted to the EPA for approval at least 15 business days prior to any works that are the subject of the agreement being undertaken. A copy of the Community Agreement is to be kept on site by Seymour Whyte for the duration of the EPL and also be made available on Seymour Whyte's project website for the duration of the agreement (personal details of noise sensitive receivers must be omitted).
7) Once the relevant authority approvals have been awarded, the ESR will endorse and issue the internal OOHW permit for sign-off and issue to the construction team.
8) Noise monitoring and reporting will be carried out in accordance with the Construction Noise and Vibration Monitoring Program, and Section 9.6 of the CNVMP.

9 Compliance management

9.1 Roles and responsibilities

The organisational structure for the M12 Central package and overall roles and responsibilities are outlined in Section 5.1 of the CEMP. Specific responsibilities for the implementation of standard mitigation measures are detailed in Section 8 of the CNVMP.

The ESR is responsible for endorsing all OOHW (refer to Attachment 1). TfNSW are to be notified of Approved OOHW to be undertaken. This notification will typically occur through TfNSW's review and approval of draft community notifications.

The Seymour Whyte Community Relations Manager, in conjunction with TfNSW, will be responsible for ensuring that notification and consultation has occurred with community stakeholders, in accordance with CoA, EPL and OCS, on the likely impacts of OOHW activities.

The ESR will implement and oversee the Construction Noise and Vibration Monitoring Program for OOHW to assess compliance with the CoA, the EPL and the OOHW Procedure. The ESR is also responsible for notifying the ER, EPA and Planning Secretary of any noise exceedances or complaints during OOHW.

9.2 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 Procedure. Training will include inductions, toolbox talks, pre-starts and targeted training as required.

9.3 Monitoring and inspections

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

Noise and vibration monitoring will also occur routinely for the duration of the M12 Central package, in accordance with the Construction Noise and Vibration Monitoring Program, which is detailed in Appendix B of the CNVMP. The Construction Noise and Vibration Monitoring Program details when monitoring will be undertaken, as well as the representative locations adjacent to the construction works where noise and vibration monitoring will be undertaken.

Attended monitoring of OOHW will be carried out as determined by the quantitative noise assessment with consideration of the Additional Mitigation Measures identified in Section 7. Additional noise and vibration monitoring will also be carried out if complaints about an OOHW activity are received which is attributable to the works.

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 the relevant noise modelling undertaken as part of the

Community Agreement, work practices will be modified so that measured noise levels do not exceed predicted levels.

In the event that OOHW is undertaken without approval, or if approved OOHW are undertaken but not carried out in accordance with the conditions of the approval or required management measures, the non-conformances / non-compliances will be determined (refer to Section 7.3 of the CEMP) and be reported as an incident in accordance with TfNSW Incident Classification and Reporting Procedure.

9.4 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of the noise and vibration management measures, compliance with this OOHW Procedure, CNVMP, CoA, EPL and other relevant approvals, licenses, and guidelines. Audit requirements are detailed in Section 7.4 of the CEMP.

9.5 Reporting

Reporting requirements relevant to the management of noise and vibration, including OOHW are identified in Table 9-2 of the CNVMP. Reporting of noise and vibration monitoring results is detailed in the Monitoring Program (Appendix B of the CNVMP). Requirements and responsibilities for reporting are further described in Section 7.5 of the CEMP. Upon request of an authorised officer of the EPA, Seymour Whyte must provide within five (5) business days:

- Construction noise and vibration impact assessment(s) required by EPL condition L5.6(a)
- Noise monitoring results required by EPL condition L5.6(b)
- Written evidence demonstrating the works are necessary and permitted under EPL condition L5.6
- Any other relevant information or records requested by the EPA.

Accurate records will be maintained substantiating all construction activities associated with the M12 Central package or relevant to the conditions of approval, including measures taken to implement this OOHW Procedure. Records will be made available to the EPA, and DPHI upon request, within the timeframe nominated in the request.

9.6 Review and improvement

The continuous improvement will be achieved through the ongoing evaluation of environmental management performance as described in Section 10 of the CNVMP. The ESR is responsible for ensuring stage-specific environmental risks are identified and included in the M12 Central package risk register and appropriate mitigation measures implemented throughout the construction, as part of the continuous improvement process. The process for ongoing risk identification and management during construction is outlined in Section 4.1.2 of the CEMP.

The processes described in Section 7.7 of the CEMP may result in the need to update or revise this OOHW Procedure. This will occur as needed. Any revisions to this Plan and other Sub-plans will be in accordance with the process outlined in Section 1.12 of the CEMP. A copy of the updated OOHW Procedure and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure (refer to Section 7.6.2 of the CEMP).

Attachment 1 – M12 Central OOHW Permit

M12 Central package – Seymour Whyte (internal) Out of Hours Works (OOHW) Permit

SECTION A – APPLICATION DETAILS		
A1	Permit Number	YR-MT-OOHW-xx
A2	Title	
A3	Application Date	
A4	Permit raised by	
A6	Justification for the works (note: non-applicable clauses can be deleted)	**Exemptions to standard construction hours for:** ☐ L5.3 Low Noise Impact works ☐ L5.4 a) I Emergency works ☐ L5.4 a) ii Delivery of oversized plant, structures or materials - need confirmation from police or other authority that special arrangements need to apply. **Works approved outside the standard construction hours:** ☐ L5.5 a) High risk to construction personnel or public safety ☐ L5.5 b) High risk to road network operational performance ☐ L5.5 c) High risk to the operation and integrity of the utility network ☐ L5.5 d) Road authority have refused to issue a road occupancy licence during standard construction hours ☐ L5.5 e) Sydney Trains (or other rail authority) requires a rail possession **Community Agreement** ☐ E1.1 Agreement between the licensee and a substantial majority of noise sensitive receivers has been reached Proposed works do not fit into the exemptions, approved agreed work categories ☐ EPL variation application required ☐ Reschedule works to the Standard construction hours
A7	EPL revision at time of permit issue	EPL 21596, Licence version date: 06-Dec-2022
A8	SWC Foreman	Name: Mobile Number:
A9	Subcontractor (if applicable)	Subbie Name: Contact Name: Mobile Number:
	Traffic Management	☐ Required ☐ Not required If required, describe location and nature of traffic changes:

SWC AUTHORISATION		
A10	SWC Environmental Site Representative	Print name: Tom Bath Signature: Date:
A11	SWC Community and Stakeholder Manager	Print name: Jennifer Gatt Signature: Date:
A12	SWC Traffic Manager	Print name: Nino Boifava Signature: Date:

PERMIT RECIPIENT			PERMIT SURRENDER
A16	Project Engineer	Print name: Signature: Date:	Print name: Signature: Date:
A17	Foreman	Print name: Signature: Date:	Print name: Signature: Date:
A18	Subcontractor representative	Print name: Signature: Date:	Print name: Signature: Date:

PERMIT CLOSE OUT		
A19	SWC Environmental Site Representative	☐ The works under this permit have been completed and the permit is now closed Signature:

SECTION B – OUT OF HOURS WORKS ASSESSMENT		
B1	Description of the proposed activity	*Works include the following:* • *Details here*
B2	Proposed dates / duration	Start Date: Start Time: Finish Date: Finish Time: Contingency dates (if applicable): ☐ Works proposed over more than 2 consecutive nights
B4	Plant / equipment and number to be used Notes: Group by activity schedule where relevant to model separate activities. Add additional activities if required. Refer to attached plant list in supporting information	Scenario 1: Scenario 2: Scenario 3: Scenario 4: Scenario 5: Scenario 6: Scenario 7: Traffic Control Additional plant ☐ Light vehicles ☐ Deliveries ☐ Temporary lighting x number ☐ Generator(s) x number ☐ Hand tools ☐ Rattle guns
B3	Scheduling	☐ Morning Shoulder OOHW: ☐ Day OOHW: ☐ Evening Shoulder OOHW: ☐ Evening OOHW: ☒ Night OOHW:
B5	Concurrent construction activities	Describe concurrent construction activities and measures taken to coordinate concurrent works: (Attached evidence of consultation where relevant)

SECTION C – NOISE, VIBRATION AND LIGHT SPILLL ASSESSMENT

C1 — **Assessment prepared by acoustic consultant attached**

☐ **Yes – complete assessment below C2 – C7 and attach Knownoise assessment (CNVIS) for each activity / scenario proposed**

C2 — Noise management objectives

Reference NCA:

NCA	Monitoring location	Noise Management Level, $L_{Aeq\ 15\ minute}$								
		Standard hours		Outside approved hours						
		Noise affected	Highly noise affected	Morning shoulder	Day	Evening shoulder	Evening	Night	Sleep disturbance (CNVS)	
									$L_{Aeq,\ 15\ minute}$	L_{Amax}
NCA01	L01	55	75	50	50	49	49	45	45	55
NCA02	L01	55		50	50	49	49	45	45	55
NCA03	L05	49		44	44	44	44	40	40	52
NCA04	L03	64		59	59	53	53	42	42	52
NCA05	L02	46		41	41	41	41	39	39	52
NCA06	L05	49		44	44	44	44	40	40	52
NCA07	L06	44		39	39	39	39	36	36	52

C3 — Nearest Sensitive Receiver(s)

- Address(es): Refer attached Noise Assessment Summary
- Distance(es): Refer attached Noise Assessment Summary

☒ Map showing location of works and nearest sensitive receiver included in **attached Noise Assessment Summary**

C4 — Predicted Noise Level and nearest sensitive receiver

- Scenario 1 dB(A)
- Scenario 2 dB(A)
- Scenario 3 dB(A)
- Scenario 4 dB(A)
- Scenario 5 dB(A)
- Scenario 6 dB(A)

☒ Noise assessment (CNVIS) for each activity attached

C5 — Noise Screening assessment

Populate with perception level from Table 1 in the Supporting Information

Activity	Standard	Day OOH	Evening OOH	Night OOH	Sleep Disturbance
RBL	64	59	53	42	52
Activity 1					
Activity 2					
Activity 3					
Activity 4					
Activity 5					
Activity 6					

SECTION C – NOISE, VIBRATION AND LIGHT SPILLL ASSESSMENT		
C6	Maximum Predicted airborne LAeq(15min) noise level above RBL at nearest receiver Note: All sensitive receivers with impact clearly audible or higher should be identified and grouped by perceived impact levels Refer to Table 1 in the Supporting Information	☐ Morning Shoulder OOH ☐ Day OOH ☐ Evening Shoulder OOH ☐ Evening OOH ☐ Night OOH ☐ Sleep disturbance
C7	Vibration intensive plant such as rock breakers, piling rigs or vibratory rollers involved in works	☐ Not Required ☐ Yes: If yes, will work be required within Safe working distances for vibration intensive plant (CNVG):
C8	Temporary lighting	☐ Not Required ☐ Required *Lighting to be positioned to minimise light spill to nearby receivers.*

SECTION D MITIGATION MEASAURES AND MONITORING SCHEDULE		
D1	Site / activity specific mitigations to be implemented	☐ Scheduling: *Describe* ☐ Plant and equipment selection: *Describe* ☐ Shielding: *Describe* ☐ Noise attention curtains: *Describe*
D2	Describe alternative methods of construction or innovative technologies that would potentially reduce noise and vibration if the potential noise and vibration exceeds the relevant criteria	☐ Alternate methods:

D3	Additional mitigation measures (Refer to Attachment D)	☐ N – Notification ☐ SN – Specific Notification ☐ V – Verification ☐ IB – Individual Briefings ☐ RO – Respite Offer ☐ R1 – Respite Period 1 ☐ R2 – Respite Period 2 ☐ DR – Duration respite ☐ PC – Phone calls ☐ AA – Alternative Accommodation ☐ Justification if required mitigation measures is not implemented: *Describe*
D4	Additional noise and vibration mitigation measures as negotiated with affected residents and other sensitive receivers Attached evidence of consultation where relevant	☐ Not applicable ☐ Applicable - describe
D5	Noise Monitoring (additional to routine monitoring)	☐ Not applicable ☐ Applicable – verification monitoring will be undertaken to determine if predicted noise levels are achieved. Monitoring Locations:
D6	Vibration Monitoring (additional to routine monitoring)	☐ Not applicable ☐ Applicable - describe Monitoring Locations:
D7	Night time lighting defect inspection (required first time temporary night lighting is established at a new location)	☐ Not applicable ☐ Applicable – describe Monitoring Locations: