

Appendix B4 Construction Noise and Vibration Management Sub- plan

M12 Motorway West

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Details of Revision Amendments

Document Control

The Project Director is responsible for ensuring that this plan is reviewed and approved. The Project Director is responsible for updating this plan to reflect changes to construction, legal and other requirements, as required.

Amendments

Any revisions or amendments must be approved by the Project Director and/or client before being distributed / implemented.

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Document Review

Position	Name	Signature	Date
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Distribution of controlled copies

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Acronyms and Abbreviations

Abbreviations	Expanded Text
ABL	Assessment Background Level
Allowable hours	Works undertaken from 1:00pm and 6:00pm on Saturday (the work hours on Saturdays identified in the Infrastructure Approval)
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far
AR	Amendment Report
ARSR	Amendment Report to the Submissions Report
Attenuation	The reduction in the level of sound or vibration
AVTG	Assessing Vibration – a technical guideline (DEC 2006)
CCHMP	Construction Cultural Heritage Management Plan
CEMP	Construction Environmental Management Plan
CMS	Complaints Management System
CNVMP	Construction Noise and Vibration Management Sub-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 CEMP, works approved under a Site Establishment Management Plan, demolition of acquired residential houses, structures and sheds, and works specified in Appendix B and approved under an environmental management plan(s) in accordance with Condition A24.
CPBGG JV	CPB Contractors and Georgiou Group Joint Venture
CSSI	Critical State Significant Infrastructure
DAWE	Commonwealth Department of the Water, Agriculture and Environment
dB(A)	Decibels using the A-weighted scale measured according to the frequency of the human ear
DEC	Department of Environment and Conservation (now EPA)
DECC	Department of Environment and Climate Change (now EPA)
DECCW	Department of Environment, Climate Change and Water (now EPA)
DPE	NSW Department of Planning and Environment (formerly DPIE)
DPIE	NSW Department of Planning, Industry and Environment
DR	Duration Respite
EES	Environmental, Energy and Science (a part of NSW DPE)
EIS	Environmental Impact Statement

Abbreviations	Expanded Text
EMM	Environmental Management Measure
EMS	Environmental Management System
Environmental Assessment Documentation	Collective reference to the M12 EIS (Oct 2019), Submissions Report (Oct 2020), Amendment Report (Oct 2020), Amendment Report-Submissions Report (Dec 2020) and supplementary reports as detailed in NSW CoA A1.
Environmental aspect	Defined by AS/NZS ISO 14001:2015 as an element of an organisation's activities, products or services that can interact with the environment.
Environmental impact	Defined by AS/NZS ISO 14001:2015 as any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects.
Environmental objective	Defined by AS/NZS ISO 14001:2015 as an overall environmental goal, consistent with the environmental policy, that an organisation sets itself to achieve
Environmental target	Defined by AS/NZS ISO 14001:2015 as a detailed performance requirement, applicable to the organisation or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	NSW Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPL	Environment Protection Licence
ER	Environmental Representative
ERG	Environmental Review Group – generally comprising representatives of TfNSW, ER, Project delivery team, regulatory authorities (EPA, EES) 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	Environment and Sustainability Manager (TfNSW)
ESR	Environmental Site Representative (CPBGG JV)
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 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: <ul style="list-style-type: none"> ▪ Use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work ▪ Grinding metal, concrete or masonry ▪ Rock drilling ▪ Line drilling ▪ Vibratory rolling ▪ Bitumen milling or profiling ▪ Jackhammering, rock hammering or rock breaking ▪ Impact piling.
IB	Individual briefing
ICNG	Interim Construction Noise Guideline (DECC 2009)
Infrastructure Approval	Approval (SSI 9364) for carrying out of the M12 Project under Section 5.19 of the <i>Environmental Planning and Assessment Act 1979</i> subject to specific CoA as detailed in Schedule 2 of the approval.
km	Kilometres
LAeq (15min)	The A-weighted equivalent continuous (energy average) A-weighted sound pressure level of the construction works under consideration over a 15-minute period and excludes other noise sources such as from industry, road, rail and the community
LA (max)	The A-weighted maximum noise level only from the construction works under consideration, measured using the fast time weighting on a sound level meter
LGA	Local Government Area
NCA s	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
OCEMP	Overarching Construction Environmental Management Plan
OCS	Overarching Communication Strategy
OEH	Office of Environment and Heritage, now EES
OOHW	Out-of-Hours Works – work completed outside of standard construction hours
Planning Secretary	Secretary of the NSW Department of Infrastructure, Planning and Environment, or delegate
PLO	Public Liaison Officer
Primary CoA/REMM	CoA/REMM that are specific to the development of this Plan

Abbreviations	Expanded Text
Project, the	M12 Motorway West Project
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(s)
Standard construction hours	Hours during which construction work is permitted by the CoA
SN	Specific notifications
SWL	Sound Power Level
SPL	Sound Pressure Level
TfNSW	Transport for New South Wales
VDVs	Vibration dose values
Work	Any physical work to build or facilitate the building of the CSSI, including low impact work, environmental management measures and utility works. However, it does not include activities that inform or enable detailed design of the CSSI and generate noise that is no more than 5 dB(A) above the rating background level at any sensitive receiver.
WSIA	Western Sydney International Airport

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 West (the Project). CPB Contractors and Georgiou Group Joint Venture (CPBGG JV) has been awarded the M12 West project which is a construct only contract between The Northern Road, Luddenham and approximately 250m east of Badgerys Creek.

An Overarching Construction Environmental Management Plan (OCEMP) has been prepared by TfNSW to address the requirements of the NSW Minister's Conditions of Approval (CoA), Commonwealth Conditions of Approval, the environmental management measures detailed in the M12 Motorway Environmental Impact Statement (EIS), Revised Environmental Management Measures (REMMs) detailed in the Amendment Report (AR), Amendment Report-Submissions Report (ARSR), applicable legislation and Transport for New South Wales (TfNSW) Quality Assurance (QA) specifications. The OCEMP was approved by DPIE on 21/12/2021.

This CNVMP has been prepared by CPBGG JV to address the requirements of the OCEMP, M12 Construction Noise and Vibration Management Sub-Plan, all relevant TfNSW specifications, Environment Protection Licence (EPL) conditions, REMMs and applicable legislation.

1.2 Background

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

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

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

CEMP The Project will involve building 6km of dual carriageway motorway predominantly through greenfield area between The Northern Road, Luddenham and approximately 250m east of Badgerys Creek with a wide median to allow for future widening to six lanes. A detailed project description is outlined in Section 1.3 of the CEMP.

1.3 Scope of the Plan

The scope of this CNVMP is to describe how CPBGG JV propose to manage potential noise and vibration impacts during construction of the Project. In accordance with NSW CoA A7, references in the terms of this CNVMP to any guideline, protocol, Australian Standard or policy are to such guidelines, protocols, Standards or policies in the form they are in as at the date of SSI approval.

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

1.4 Environmental Management Systems overview

The overall Environmental Management System (EMS) for the Project is described in Section 3.1 of the Construction Environmental Management Plan (CEMP).

This CNVMPs has been prepared to include applicable requirements outlined in the OCEMP, the Environment Protection Licence (EPL) (licence number 21595) and the EMS.

Management measures identified in this CNVMP may also be incorporated into site or activity specific Environmental Work Method Statements (EWMS). EWMS incorporate appropriate mitigation measures and controls and identify key procedures to be used concurrently with the EWMS.

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

Used together, the CEMP, strategies, procedures and EWMS form management guides that clearly identify required environmental management actions for reference by TfNSW and CPBGG JV.

1.4.1 CNVMP preparation, endorsement and approval

The CEMP, sub-plans and monitoring programs will go through a review and update process as described in section 3.1 of TfNSW Specification G36 to ensure the CEMP have been developed in accordance with the OCCEMP and EPL. TfNSW will provide the CEMP to the ER for approval. Construction must not commence until the ER has approved this sub plan and monitoring program.

A hold point shall be submitted in accordance with G36 Section 3.1 - Preparation and submission of CEMP. TfNSW shall consider the documents prior to authorising the release of the Hold Point. TfNSW may request additional information for inclusion in the CEMP before authorising the release of the Hold Point.

The monitoring programs must be implemented for the duration of construction or for any longer period as set out in the monitoring program or as specified by the Planning Secretary, whichever is greatest in accordance with NSW CoA C17.

1.4.2 Interactions with other management plans

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

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

1.5 Consultation

Section 1.9.2 (Table 1-5) of the OCCEMP outlines consultation undertaken during the development of the OCCEMP as required by the CoA and Revised Environmental Management Measures (REMMs). 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.

A copy of CPBGG JV CEMP Sub-Plans (including this CNVMP) will be provided to the relevant government agencies for their information once these documents have been approved by the Independent Environmental Representative (ER).

CPBGG JV will liaise with TfNSW regarding any additional consultation requirements required for the development of the Contractors CEMP

1.5.1 Ongoing consultation during construction

Consultation between TfNSW, CPBGG JV, stakeholders, and community and relevant agencies regarding the management of noise and vibration impacts will be undertaken during the construction of the Project as required. The process for the consultation will be documented in the CSEP.

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

The CPBGG JV will consult with the community with regards to respite at affected locations, in accordance with the consultation requirements prescribed by NSW CoA E37 and E47. The outcomes of the community consultation, the identified respite periods and the scheduling of the likely Out-of-Hours Work (OOHW) will be provided to the EPA, ER and Planning Secretary for information prior to the OOHW occurring. The consultation must include (but not be limited to) providing the community with:

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

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

In accordance with NSW CoA E39, prior to scheduling the construction works, CPBGG JV will in accordance with the CSEP consult with potentially-affected community, religious and educational institutions and noise and vibration-sensitive businesses and critical working areas (such as flight simulators, theatres, laboratories and operating theatres) to determine whether any sensitive time periods are applicable. Noise and vibration generating work resulting in noise levels above the NMLs must not be timetabled within these sensitive periods unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution. Refer to section 5.3 for project work hours.

1.5.2 Consultation with other projects and utility providers

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

- Liaison with councils and utility providers. The relevant owner or provider of the service or utility will be consulted to make suitable arrangements for access to diversion, protection and support of the affected infrastructure as required
- Works undertaken outside of construction hours e.g. NSW CoA E36 Safety and Emergencies.
- Liaison with other projects being constructed in the area to understand impacts and multiple impact.

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

2 Purpose and objectives

2.1 Purpose

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

2.2 Objectives

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

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

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

2.3 Targets

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

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

3 Environmental requirements

3.1 Relevant legislation

3.1.1 Legislation

Legislation and regulations relevant to noise and vibration management includes:

- *Protection of the Environment Operations Act 1997* (POEO Act)
- *Protection of the Environment Operations (Noise Control) Regulation 2008*.

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* (TfNSW 2016)
 - *Draft Construction Noise and Vibration Guidelines* (TfNSW 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
- PS310 – 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 below. 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)	Section 1.5
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 5.3.4
C11	(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
	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 A
C14	The Construction Noise and Vibration Monitoring Program must include, but not be limited to: (a) noise and vibration monitoring at representative residential and other locations (including at the worst- affected residences), subject to property owner approval, to confirm construction noise and vibration levels; (b) noise monitoring during the day, evening and night time periods throughout the construction period, covering the range of activities (including worst-case construction noise levels) being undertaken; (c) method and frequency for reporting monitoring results; and (d) procedures to identify and implement additional mitigation measures where monitoring indicates noise and/or vibration levels in excess in excess of noise and vibration criteria.	Section 9.5.1 Appendix A

CoA No.	Condition Requirements	Document Reference
E34	Work must only be undertaken during the following hours: <ul style="list-style-type: none"> • 7:00 am to 6:00 pm Mondays to Fridays, inclusive; • 8:00 am to 6:00 pm Saturdays; and • 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: <ul style="list-style-type: none"> • between the hours of 8:00 am to 6:00 pm Monday to Friday; • between the hours of 8:00 am to 1:00 pm Saturday; and • 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.	Section 5.3.2
E36	Notwithstanding Condition E34 and E35, Work may be undertaken outside the hours specified in any of the following circumstances <ul style="list-style-type: none"> • Safety and Emergencies, including: <ul style="list-style-type: none"> ○ 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; 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. <ul style="list-style-type: none"> • Work that causes: <ul style="list-style-type: none"> ○ $L_{Aeq(15\text{ minute})}$ noise levels: <ul style="list-style-type: none"> ▪ 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 ○ $L_{AFmax(15\text{ minute})}$ 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 the preferred values for human exposure to vibration, specified in Table 2.2 of <i>Assessing Vibration: a technical guideline</i> (DEC, 2006); and ○ intermittent vibration values measured at the most affected residence that are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of <i>Assessing Vibration: a technical guideline</i> (DEC, 2006). • By Approval, including: <ul style="list-style-type: none"> ○ where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or ○ 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

CoA No.	Condition Requirements	Document Reference
	<ul style="list-style-type: none"> ○ negotiated agreements with directly affected residents and sensitive land user(s). 	
E37	<p>An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of Work which is outside the hours defined in Condition E34, and that are not subject to an EPL. The Protocol must be approved by the Planning Secretary before commencement of the out-of-hours Work. The Protocol must be prepared in consultation with the ER. The Protocol must provide:</p> <ul style="list-style-type: none"> • identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where: <ul style="list-style-type: none"> ○ the ER reviews all proposed out-of-hours activities and confirm their risk levels, ○ low risk activities can be approved by the ER, and ○ high risk activities that are approved by the Planning Secretary; • a process for the consideration of out-of-hours work against the relevant NML and vibration criteria; • 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; • 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 • 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. <p>This condition does not apply to Work where the requirements of Condition E36(a) or (b) are met.</p>	TfNSW OOHW Protocol Section 1.5.2 Section 5.3.4
E38	<p>Mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration objectives</p> <ul style="list-style-type: none"> • construction 'Noise affected' NML established using the Interim Construction Noise Guideline (DECC, 2009); • vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure); • BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and • the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures (for structural damage). <p>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.</p> <p><i>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.</i></p>	Section 2 Section 3 Section 8
E39	<p>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.</p>	Section 1.5.2 Section 4.1 Section 8

CoA No.	Condition Requirements	Document Reference
E40	Noise and Vibration Impact Statements (NVIS) must be prepared for any Work that may exceed the noise management levels and vibration criteria specified in Condition E38 at any residence outside the construction hours identified in Condition E34, or where receivers will be highly noise affected. The NVIS must include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures must be implemented for the duration of the Work. A copy of the NVIS must be provided to the ER prior to the commencement of the associated Work. The Planning Secretary may request a copy/ies of the NVIS.	Section 8 Section 9.9.1 Appendix B
E41	Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage must be notified before Work that generates vibration commences in the vicinity of those properties. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owners and occupiers must be provided with a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances, unless otherwise agreed by the owner and occupier. These properties must be identified and considered in the Noise and Vibration CEMP Sub-plan required by Condition C4 and the Communication Strategy required by Condition B1.	Section 8 Section 9.9.1 OCS
E42	The Proponent must conduct vibration testing during vibration generating activities that have the potential to impact on heritage items to identify minimum working distances to prevent cosmetic damage. In addition, vibration monitoring must be undertaken during construction for relevant remaining Fleurs Radio Telescope structures, the Upper Canal (in consultation with WaterNSW) and McMaster Farm and McGarvie-Smith Farm group of remaining buildings. In the event that the vibration testing and attended monitoring shows that the preferred values for vibration are likely to be exceeded, the Proponent must review the construction methodology and, if necessary, implement additional mitigation measures.	Section 7.3
E43	Advice from a heritage specialist must be sought on methods and locations for installing equipment used for vibration, movement and noise monitoring at heritage-listed structures.	Section 5.6 Section 8
E44	Before conducting at-property treatment at any heritage item identified in the documents listed in Condition A1, the advice of a suitably qualified and experienced built heritage specialist must be obtained and implemented to ensure such work does not have an adverse impact on the heritage significance of the item.	Section 8
E45	All Work undertaken for the delivery of the CSSI, including that undertaken by third parties (such as utility relocations), must be coordinated to ensure respite periods are provided. The Proponent must: <ul style="list-style-type: none"> 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 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 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 8 Appendix B
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: <ul style="list-style-type: none"> 10:00 pm and 7:00 am, Monday to Friday; 10:00 pm Saturday to 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, 	Section 8 Appendix B

CoA No.	Condition Requirements	Document Reference
	<p>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.</p> <p>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.</p>	
E47	<p>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.</p> <p>This consultation must include (but not be limited to) providing the community with:</p> <ul style="list-style-type: none"> • a progressive schedule for periods no less than three (3) months, of likely out-of-hours Work; • a description of the potential Work, location and duration of the out-of-hours Work; • the noise characteristics and likely noise levels of the Work; and • 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). <p>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.</p> <p><i>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.</i></p>	<p>Section 1.5.2 Section 8 Appendix B</p>
E48	<p>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).</p>	Section 8
E49	<p>Blasting is not permitted as part of this CSSI approval.</p>	Section 8
E56	<p>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.</p>	Section 8
E76	<p>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</p>	Section 8
E77	<p>Where pre-construction surveys have been undertaken in accordance with Condition E76, subsequent post-construction surveys of the structure / asset must be undertaken by a suitably qualified and experienced engineer and/or building surveyor to assess damage that may have resulted from the vibration-generating works. The results of the post-construction surveys must be documented in a Post-Construction Condition Survey Report for each item surveyed. The Post-construction Condition Survey Reports must be provided to the owner of the structures/assets surveyed, and no later than four (4) months following the completion of construction activities that have the potential to impact on the structure / asset</p>	Section 8

3.3 Revised Environmental Management Measures

The primary REMMs relevant to the development of this Plan are listed in Table 3-2 below. 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
	<ul style="list-style-type: none"> Identify nearby sensitive receivers 		Section 4.1
	<ul style="list-style-type: none"> Include a description of the construction activities equipment and working hours 		Section 7.1
	<ul style="list-style-type: none"> Identify relevant noise and vibration performance criteria for the project and license and approval conditions. 		Section 3 Section 5.2 Section 5.6
	<ul style="list-style-type: none"> Include modelling results showing construction noise impacts based on detailed design information 		Section 7
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> Outline requirements for the development and implementation of an Out-of-hours Work Protocol 		TfNSW OOHW Protocol Section 5.3.4 Appendix B
	<ul style="list-style-type: none"> Outline requirements for noise and vibration monitoring that will be carried out to monitor project performance associated with the noise and vibration criteria 		Section 9.5 Appendix A
	<ul style="list-style-type: none"> Describe community consultation and complaints handling procedures in accordance with the Community Communication Strategy to be developed for the project 		Section 1.5 Section 9.2 Section 9.3 OCS
	<ul style="list-style-type: none"> Outline measures to manage noise impacts associated with heavy vehicle movements both on and offsite 		Section 8

ID	Measure/Requirement	Timing	Document Reference
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> Outline requirements to minimise and manage construction fatigue, in consultation with the community. 		Section 8

3.4 Environmental Protection Licence

The primary EPL conditions relevant to the development of this Plan are listed in Table 3-3 below. A cross reference is also included to indicate where the EPL condition is addressed in this Plan or other Project documents.

Table 3-3 Environmental management measures relevant to this Plan

ID	Measure/Requirement	Timing	Document Reference
L3.1	The licensee must minimise noise and vibration impacts at residences and other sensitive land uses. To meet the requirements of this condition the licensee must:	During construction	This Plan
	a) implement the guidance in the Interim Construction Noise Guideline (DEC, 2009) and the Assessing Vibration: a technical guideline (DEC, 2006);		Section 2 Section 8
	b) implement all reasonable and feasible measures to minimise noise impacts in accordance with the Interim Construction Noise Guideline (DEC, 2009); and		Section 2 Section 8
	c) implement vibration mitigation in accordance with the Assessing Vibration: a Technical Guideline (DEC, 2006).		Section 2 Section 8
	In this condition, 'reasonable' and 'feasible', in relation to noise management, have the same meaning as defined in the Interim Construction Noise Guideline (DEC, 2009).		
L3.2	When construction activities include 'High Noise Impact Activities' as defined in the special dictionary in this licence, quantitative construction noise assessments must apply a +5dB correction to the measured or predicted level of construction noise at the nearest sensitive receiver location before assessment against the Interim Construction Noise Guideline (DECC, 2009) noise management levels.	During construction	Section 8
L5.1	Standard construction hours: Unless permitted by another condition of this licence, works and activities must:	During construction	Section 8
	a) only be undertaken between the hours of 7:00 am and 6:00 pm Monday to Friday;		Section 5.3.1
	b) only be undertaken between the hours of 8:00 am and 6:00 pm Saturday; and		Section 5.3.1
	c) not be undertaken on Sundays or Public Holidays.		Section 5.3.1
L5.2	High Noise Impact Works: Unless permitted by another condition of this licence, any high noise impact works and activities must only be undertaken:	During construction	This Plan
	a) between 8:00 am and 6:00 pm Monday to Friday;		Section 5.3.2
	b) between 8:00 am and 1:00 pm Saturday; and		Section 5.3.2
	c) if high noise impact works are to be conducted continuously and the location of the works means that it is likely to impact the same receivers, then the works must be conducted in continuous blocks of no more than 3 hours, with at least a 1-hour respite between each block of continuous high noise impact work; except as expressly permitted by another condition of this licence.		Section 5.3.2

ID	Measure/Requirement	Timing	Document Reference
	<p>Note: For the purposes of this condition 'continuous' includes any period where there is a less than 1-hour respite between ceasing and recommencing of any work that is subject to this condition.</p>		
L5.3	<p>Exemptions to standard construction hours for low noise impact works: Works and activities may be carried on outside of the hours specified in condition L5.1 if the works and activities do not cause, when measured at the boundary of the most affected noise sensitive receiver:</p>	During construction	This Plan
	<p>a) LAeq(15 minute) noise levels greater than 5dB above the day, evening and night rating background level (RBL) as applicable;</p>		Section 5.3.3
	<p>b) LA1(1 minute) or LAm_{ax} noise levels greater than 15dB above the night RBL for night works;</p>		Section 5.3.3
	<p>c) the preferred continuous or impulsive vibration values greater than those for human exposure to vibration, set out for residences in Table 2.2 in Assessing Vibration: a technical guideline (DEC, 2006); and d) the preferred intermittent vibration values greater than those for human exposure to vibration, set out for residences in Table 2.4 in Assessing Vibration: a technical guideline (DEC, 2006).</p> <p>For the purposes of this condition, the RBLs are those contained in an environmental assessment for the activities subject to this licence prepared under the Environmental Planning and Assessment Act 1979. Alternatively, the licensee may use another RBL determined in accordance with the Noise Policy for Industry (EPA, 2017) and provided to the EPA prior to carrying out any works or activities under this condition. The notification requirements under condition L5.7 do not apply to this condition.</p>		Section 5.3.3
L5.4	<p>Exemptions to standard construction hours in exceptional circumstances</p>	During construction	This Plan
	<p>a) The licensee may undertake works and activities outside of standard construction hours specified in condition L5.1 for:</p> <ul style="list-style-type: none"> i. emergency works required to avoid injury or the loss of life; or to avoid damage or loss of property, or to prevent harm to the environment; and ii. the delivery of oversized plant, structures or materials determined by the police or other authorised authorities to require special arrangements to transport along public roads. 		Section 5.3.3
	<p>b) The licensee must, on becoming aware of the need to undertake emergency works under this condition notify the EPA's Environment Line as soon as practicable and submit a report to the EPA by 2:00 pm on the next business day after the emergency works commenced that describes:</p> <ul style="list-style-type: none"> i. the cause, time and duration of the emergency; ii. action taken by or on behalf of the licensee in relation to the emergency; and iii. details of any measures taken or proposed to be taken by the licensee to prevent or mitigate against a recurrence of the emergency. <p>Note: Emergency works do not require a notification under condition L5.7.</p>		Section 5.3.3
L5.5	<p>Works outside of standard construction hours: Under this condition, works and activities may be undertaken outside of standard construction hours specified in condition L5.1 and L5.2, but only if they are required in relation to one or more of the following:</p>	During construction	This Plan

ID	Measure/Requirement	Timing	Document Reference
	a) carrying on those works and activities during standard construction hours would result in a high risk to construction personnel or public safety, based on a risk assessment carried out in accordance with AS/NZS ISO 31000:2018 "Risk Management";		Section 5.3.4
	b) the Relevant Road Network Operator has advised the licensee in writing that carrying out the works and activities during standard construction hours would result in a high risk to road network operational performance;		Section 5.3.4
	c) a relevant utility service operator has advised the licensee in writing that carrying out the works and activities during standard construction hours would result in a high risk to the operation and integrity of the utility networks;		Section 5.3.4
	d) the TfNSW Transport Management Centre (or other road authority) have refused to issue a road occupancy licence during standard construction hours; or		Section 5.3.4
	e) Sydney Trains (or other rail authority) requires a rail possession for the activities to be performed outside of standard construction hours		Section 5.3.4
L5.6	Works outside of standard construction hours - Regulatory Requirements In undertaking any works and activities outside of standard construction hours under condition L5.5, the licensee must comply with the following:	During construction	This Plan
	a) Prepare a construction noise and vibration impact assessment in accordance with the Interim Construction Noise Guideline (DEC, 2009) that is to include: i. a description of the proposed works and activities outside of standard construction hours ; ii. 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 condition L5.3; and iii. 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.		Section 5.3.2 Section 5.3.3 Section 5.3.4 Section 7 Appendix B
	b) Undertake noise monitoring in accordance with the monitoring plan required by condition L5.6(a)(iii).		Appendix B
	c) Only undertake activities between the hours of 6:00pm on Mondays, Tuesdays, Wednesdays, Thursdays, Fridays and 7:00am the following day (unless permitted by another condition of this licence).		Section 5.3.1
	d) Activities are not to be undertaken between the hours of 6:00pm on Saturdays, Sundays or Public Holidays and 7:00am the following day (unless permitted by another condition of this licence).		Section 5.3.1
	e) Ensure that works and activities do not result in noise levels exceeding those specified in condition L5.3 at the same noise sensitive receivers (unless specified in another condition of this licence) on more than: i. 2 consecutive evenings and/or nights at any time; and ii. 3 evenings and/or nights per week; and iii. 10 evenings and/or nights per month.		Section 5.3.2

ID	Measure/Requirement	Timing	Document Reference
	<p>f) Undertake any high noise impact works before 12:00 am (midnight) where reasonable and feasible.</p> <p>g) Where high noise impact activities are undertaken, the respite provisions as per the requirements of condition L5.2(c) do not apply provided that all High Noise Impact Activities and Works are undertaken prior to 12:00 am (midnight).</p> <p>h) Where high noise impact activities are undertaken after 12:00 am (midnight), the respite provisions in condition L5.2(c) apply.</p> <p>i) Upon request of an authorised officer, the licensee must provide within 5 business day:</p> <ul style="list-style-type: none"> i. the construction noise and vibration impact assessment required by condition L5.6(a); ii. noise monitoring results required by condition L5.6(b); iii. written evidence demonstrating the works are necessary and permitted under condition L5.6; and/or iv. any other relevant information or records requested by the EPA. v. the notification requirements under condition L5.7 apply to this condition. 		<p>Section 5.3.2</p> <p>Section 5.3.2</p> <p>Section 5.3.2</p> <p>Section 5.3.2</p>
L5.7	<p>Works outside of standard construction hours – Notification The licensee must notify potentially affected noise sensitive receivers of works outside of standard construction hours not less than 5 calendar days and not more than 14 calendar days before those works are to be undertaken.</p> <p>a) The notification must:</p> <ul style="list-style-type: none"> i. be undertaken by letterbox drop or email; and ii. be detailed on the project website. <p>b) The notification required by this Condition must:</p> <ul style="list-style-type: none"> i. clearly outline the reason that the work is required to be undertaken outside the hours specified in condition L5.1; ii. include a diagram that clearly identifies the location of the proposed works in relation to nearby cross streets and local landmarks; iii. include details of relevant time restrictions that apply to the proposed works; iv. clearly outline in plain English, the location, nature, scope and duration of the proposed works; v. detail the expected noise impact of the works on noise sensitive receivers; vi. clearly state how complaints may be made and additional information obtained; and vii. include the number of the telephone complaints line required by condition M7.1, an after hours contact phone number specific to the works undertaken outside the hours specified in condition L5.1, and the project website address. 	During construction	<p>This Plan</p> <p>Section 1.5.1 Appendix B</p> <p>Section 1.5.1 Section 1.5.2 Appendix B</p>
L5.8	<p>The licensee must coordinate all works outside of standard construction hours with any neighbouring concurrent construction works that have the potential to impact the same noise sensitive receivers to ensure respite periods are achieved.</p>	During construction	Section 1.5.2

ID	Measure/Requirement	Timing	Document Reference
M4.1	All noise monitoring for the purposes of determining compliance with the conditions of this licence must be undertaken by a suitably qualified and experienced person.	During construction	Appendix B
M4.2	All noise monitoring for the purposes of determining compliance with the conditions of this licence must consider and be undertake in accordance with;	During construction	Appendix B
	a) Australian Standard AS 2659.1 – 1998: Guide to the use of sound measuring equipment – portable sound level meters; and		Appendix B
	(b) the compliance monitoring guidance provided in the chapter 7 'Monitoring Performance' of the Noise Policy for Industry (EPA, 2017).		Appendix B
M4.3	All vibration monitoring must be:	During construction	Section 5.6.1 Appendix B
	a) undertaken in accordance with the technical guidance provided in the Assessing Vibration: a technical guideline (DEC, 2006); and		Section 5.6.1 Appendix B
	b) assessed and reported against the acceptable values of human exposure to vibration set out in Tables 2.2 and 2.4 of this guideline.		Section 5.6.1 Appendix B
M4.4	The licensee must undertake noise and vibration monitoring as directed by an authorised officer of the EPA. Where the monitoring is requested to take place on private land (for example a residential property) the licensee must request permission to access the premises in advance and keep a record of permission requests and responses. If a licensee is unable to obtain permission, they must provide the response to the EPA.	During construction	Appendix B

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. The TfNSW QA Specifications are Project contract documents and are not publicly accessible.

CPBGG JV will incorporate the appropriate M12 TfNSW QA Specifications into the CNVMP including the requirements from, but not limited to:

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

4 Existing environment

The following section summarises the existing noise and vibration conditions within and adjacent to the Project corridor, based on information contained in the Environmental Assessment Documentation. 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 by CPBGG JV. Notwithstanding, attended noise monitoring will be carried out prior to the commencement of construction to verify the noise environment.

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

4.1 Sensitive receivers

The Project is situated within two (2) local government areas (LGAs); Penrith to the north, and Liverpool to the south. The Project includes a mix of rural and suburban areas in the South West Sydney Growth Area and Western Sydney Aerotropolis and will traverse the following suburbs; Badgerys Creek and Luddenham which are sparsely populated and consist primarily of large rural lots.

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

Noise sensitive receivers and the Noise Catchment Areas (NCAs) within the Project are shown in Figure 4-1. The predicted noise contours for the bulk earthworks – peak impact scenario has been included as a reference for predicted construction noise impacts. Predicted construction noise contours for the various scenarios can be found on the M12 Motorway web portal (<http://caportal.com.au/rms/m12>) and within the M12 Motorway Amendment Report Appendix G Noise and Vibration updated technical report.

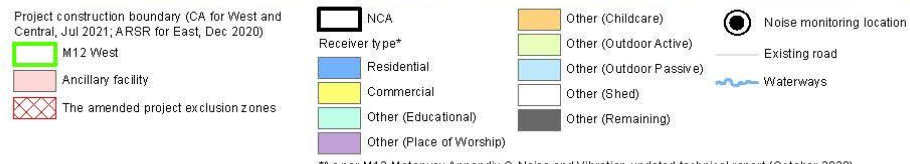
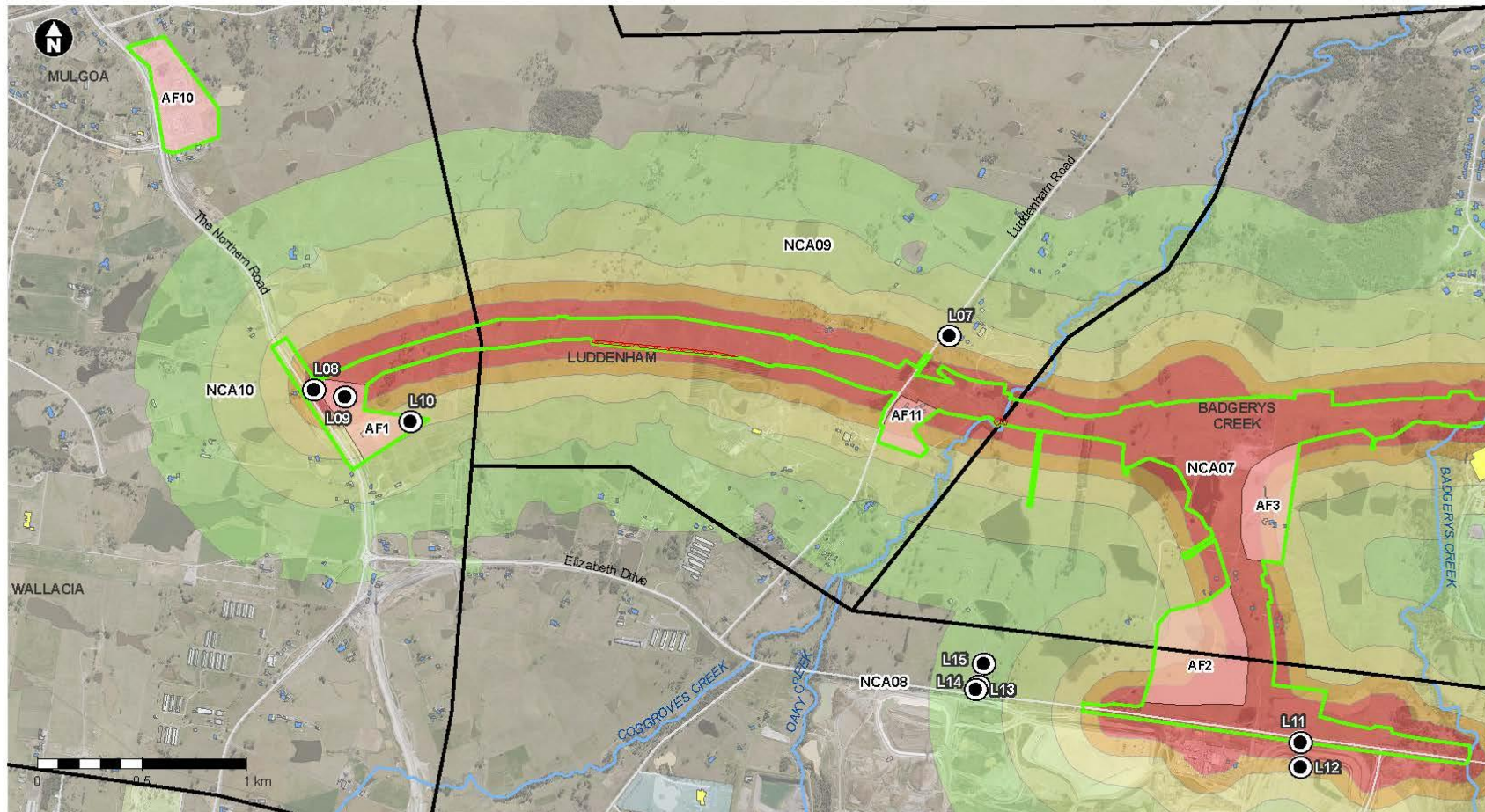


Figure 4-1 Location of noise catchment areas, noise and vibration sensitive receivers and noise monitoring location

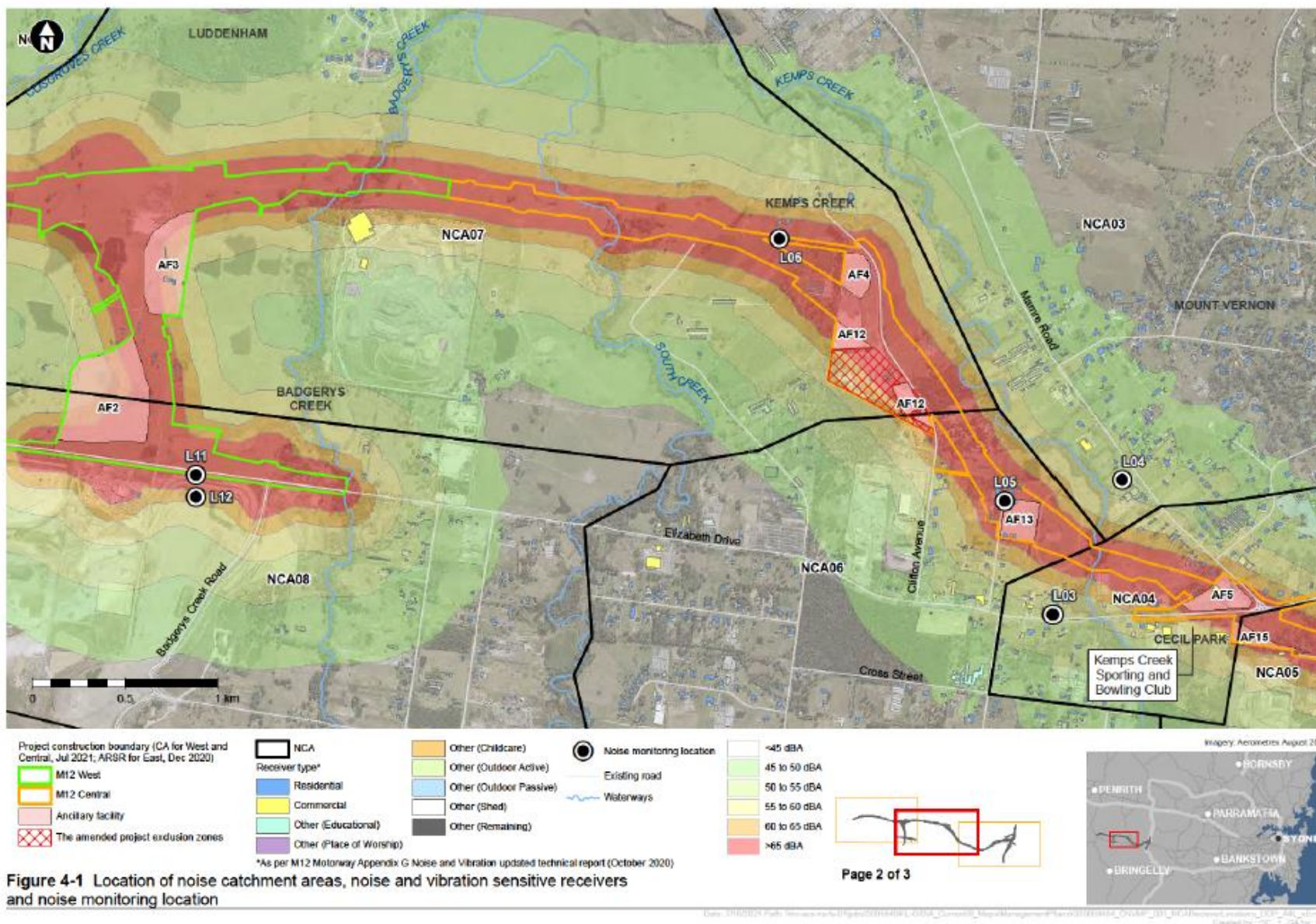


Figure 4-1 M12 West noise catchment areas, noise and vibration sensitive receivers and noise monitoring locations

4.2 Noise catchment areas

The area around the Project has been summarised using ten 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 Project.

NCAs that reflect land uses and the nature and types of receivers within each NCA were established as part of the noise assessment. The land use characteristics within each NCA are described in Table 4-1.

Table 4-1 Noise catchment areas

NCA	Minimum distance ¹	Description
NCA07 (West) (Central)	100 m	This catchment area is located to the west of Kemps Creek, east of Cosgroves Creek, and north of Elizabeth Drive. This catchment primarily consists of rural residential receivers and a cluster of residential dwellings 500 metres to the north of the Project.
NCA08 (West)	420 m	This catchment area is located along the western section of Elizabeth Drive to the west of South Creek and east of The Northern Road. This catchment is primarily rural residential.
NCA09 (West)	90 m	This catchment area is located to the west of Cosgroves Creek, east of The Northern Road, and north of Elizabeth Drive. It is set back from Elizabeth Drive and The Northern Road to represent receivers which are not adjacent to the existing major roads. This catchment represents mostly rural receivers.
NCA10 (West)	160 m	This catchment area is located along The Northern Road. It is primarily rural residential with the nearest receivers located opposite the west end of the project to the west of The Northern Road.

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 the Project area were conducted at 15 locations as part of the preparation of the Environmental Assessment Documentation, namely the EIS in 2017, and the Amendment Report in 2020. The measured noise levels were used to determine the existing noise environment and to set criteria to assess the potential impacts from the Project. The monitoring equipment was generally located at receivers which will have line-of-sight to the Project or to existing major roads, within constraints such as accessibility, security and permission of landowners.

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.

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

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

ID	Background noise (RBL) – Periods based on extended construction hours ²					Average noise level L _{Aeq} (period) based on Road Noise Policy ³	
	Morning shoulder	Day	Evening	Evening shoulder	Night	Day 15 hour	Night 9 hour
L07	46	40	36	42	31	56	52
L08	58	46	50	57	34	60	59
L09	56	44	48	54	36	56	55
L10	51	40	44	49	37	51	49
L11	57	46	40	51	31	69	66
L12	50	40	37	44	30	49	48
L13	50	42	38	48	33	64	60
L14	50	42	39	48	33	55	52
L15	50	39	40	47	34	52	49

² 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

³ 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 below.

5.1 Construction noise and assessment objectives

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

The main objectives of the ICNG are to:

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

5.2 Construction noise assessment criteria

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

5.2.1 Residential land use

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

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

Table 5-1 Residential NML guideline

Time of day	L _{Aeq(15min)}
Recommended standard construction hours <ul style="list-style-type: none"> • Monday to Friday 7 am to 6 pm • Saturday 8am to 1pm • No work on Sundays or public holidays 	Noise affected RBL + 10 dB
	Highly noise affected 75 dB(A)
Outside recommended standard hours	Noise affected RBL + 5 dB

Note: Saturday 1pm to 6pm have 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 Other sensitive land uses

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

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

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

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

Notes:

- 1 Passive recreation areas characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion.
- 2 Active recreation areas are characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion.
- 3 Applies only when properties are being used

5.3 Working hours

5.3.1 Hours of work

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

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

Any application to work between 8:00am and 6:00pm on Saturdays (the allowable work hours on Saturdays identified in the Infrastructure Approval) must be submitted to the TfNSW no later than 12:00 pm on the Thursday immediately prior to the Saturday proposed to undertake work. The application must include the details of the work activities to be undertaken. Approval is at the discretion of TfNSW.

5.3.2 High noise intensive works

As required by NSW CoA E35 and EPL condition L5.2, highly noise intensive works that result in an exceedance of the applicable NML at the same receiver must only be undertaken:

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

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

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

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

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

Expected construction noise levels are detailed in section 7.2 for the various noise generating activities. All conditions relating to construction hours outlined in the Project EPL will be complied with.

5.3.3 Variation to hours of work

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

- 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.

Note: notification to sensitive receivers will be undertaken as per the Community and Stakeholder Engagement Plan.

- Work that causes:
 - $L_{Aeq(15\ min)}$ noise levels no more than 5 dB(A) above the rating background level at any residence in accordance with the ICNG, and
 - $L_{Aeq(15\ min)}$ noise levels no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s); and
 - $L_{AFmax(15\ min)}$ noise levels no more than 15 dB(A) above the rating background level at any residence during the night time period; and
 - Continuous or impulsive vibration values, measured at the most affected residence, that are no more than those for human exposure to vibration, specified for residences in Table 2.2 of *Assessing Vibration: a technical guideline* (DEC, 2006) and
 - Intermittent vibration values, measured at the most affected residence, that are no more than those for human exposure to vibration, specified for residences in Table 2.4 of *Assessing Vibration: a technical guideline* (DEC, 2006).
- By approval:
 - 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 **Condition E37**; or
 - Where negotiated agreements with directly affected residents and sensitive land uses have been reached.

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

5.3.4 Out of hours work (OOHW)

OOHW covered by an EPL

The CPBGG JV have prepared and will implement an out of hours work (OOHW) Procedure (Appendix B) prior to commencement of construction as per the requirements of G36 for all works covered by an EPL. The CPBGG JV procedure will be approved by TfNSW and the ER as part of the CEMP and Sub-Plan approval.

OOHW not covered by an EPL

TfNSW have developed an OOHW Protocol for works not covered under an EPL in accordance with NSW CoA E37. The TfNSW Protocol must be approved by the Planning Secretary before commencement of the out-of-hours work and be prepared in consultation with the ER. The Protocol must provide:

- identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where:
 - the ER reviews all proposed out-of-hours activities and confirm their risk levels,
 - low risk activities can be approved by the ER, and
 - high risk activities that are approved by the Planning Secretary;
- a process for the consideration of out-of-hours work against the relevant NML and vibration criteria;
- 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;
- 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
- 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.

5.4 Adopted construction noise management levels

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

For work during standard construction hours:

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

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

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

The adopted Project construction NMLs and sleep disturbance screening criterion for residential receivers are provided in Table 5 3. As required by the Noise Policy for Industry (NPfI) when setting project construction NMLs, the evening NML should be no greater than the daytime NML. Likewise, the night-time NML should be no greater than the day or evening NML. Table 5 2 sets out the adopted Project construction NMLs for non-residential receivers.

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

NCA	Monitoring location	NML $L_{Aeq}(15min)$ (dBA)						Sleep disturbance screening criteria (RBL + 15 dB)
		Standard construction (RBL + 10dB)	Out-of-hours (RBL + 5dB)					
		Day ⁴	Morning shoulder ⁵	Day ⁶	Evening ⁷	Evening shoulder ⁸	Night ⁹	
NCA07 (WEST,)	L06	44	39	39	39	39	36	46
NCA08 (WEST)	L14	52	47	47	44	44	38	48
NCA09 (WEST)	L07	50	45	45	41	41	36	46
NCA10 (WEST)	L09	54	49	49	49	49	41	51

⁴ Daytime period is the standard construction hours of 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday

⁵ 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

⁶ 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

⁷ 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

⁸ 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

⁹ 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

5.4.1 Triggers for additional mitigation measures

In accordance with the CNVG, additional mitigation measures will be implemented if the NML will be exceeded. Table 5 4 (extracted Table C.1 of the CNVG) details the triggers for additional mitigation measures for air-borne noise. Table 7 2 to Table 7 6 detail the predicted construction noise exceedances for each works period.

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

Perception	Predicted airborne $L_{Aeq(15min)}$ noise level receiver		Additional mitigation measures type ¹	Mitigation levels ²
	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+20
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 (refer to detailed descriptions):	1. AA – Alternative Accommodation V – Verification IB – Individual briefings N – Notification R2 – Respite Period 2 DR – Duration Respites 2. NML – Noise Management Level		R1 – Respite Period 1 PC – Phone calls SN – Specific notifications Perception – related to the level above RBL HA – Highly Affected (>75 dB(A) – applies to residences only)	

5.5 Construction vibration assessment objectives

The following construction vibration goals apply for the Project:

- For structural damage to heritage structures, the vibration limits set out in the German Standard *DIN 4150-3: Structural Vibration - effects of vibration on structures*

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

5.6 Vibration criteria

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

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

5.6.1 Human comfort vibration

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

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

Maximum and preferred values for continuous and impulsive vibration are defined in Table 5.5. Application of the continuous and impulsive vibration criteria considers the level, duration of exposure, time of day, and varies for land uses.

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

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 values for intermittent vibration are defined in Table 5.6.

Table 5-6 Acceptable vibration dose values (m/sP1.7PP5P) 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 Includes operating theatres, precision laboratories and other areas where vibration sensitive activities may occur.

5.6.2 Structural damage

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

British Standard

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

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

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

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

Table 5-7 BS 7385 structural damage criteria

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

Notes:

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

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

5.6.2.1 German Standard

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

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

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

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

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

5.6.3 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. CPBGG JV will set a trigger alert where vibration monitoring identifies vibration at 15mm/s. At this point, construction activities will cease to minimise impact on Jemena assets. Alternative construction methods will be investigated to ensure vibration limits do not exceed 20 mm/second.

5.6.4 Safe working distances

Where vibration intensive plant such as rock breakers and vibratory rollers are used, vibration must be managed to minimise disturbance to building occupants and to avoid damage to buildings and other structures (e.g. sheds at McGarvie Smith Farm). Table 5-9 indicates the safe working distances recommended by the CNVG for typical items of vibration intensive plant that must be complied with unless otherwise approved by TfNSW following consultation with and advice from a noise and vibration specialist.

Table 5-9 Safe working distances for vibration intensive plant (TfNSW 2013)

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

Reference: M12 Motorway – Central Package, Building Condition and Public Utilities Assessment Report (GHD, 2021)

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. Safe working distances using the DIN 4150-3 criteria for heritage structures has been included in this table 5-9 and will be adopted for the project unless site trials indicate that they require adjustment.

Vibration monitoring will occur during any vibration works which are equal or within these safe working distances for cosmetic damage to ensure we are under the relevant criteria.

A heritage specialist (built structures) will be engaged by the CPBGG JV to provide advice on methods and locations for installing equipment used for vibration, movement and noise monitoring of heritage-listed structures in accordance with NSW CoA E43.

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

6 Environmental aspects and impacts

6.1 Construction activities

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

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

6.2 Environmental impacts

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

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

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

Modelling of noise and vibration shows that impacts attributable to the Project are anticipated, this is detailed in Section 7 of this Plan. Section 8 of this Plan provides a suite of mitigation measures that will be implemented to avoid or minimise noise and vibration impacts on the receiving community and/or built environment.

6.3 Cumulative impacts 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 of the extensive work that will be happening in the area with the aim of combining messages when possible and minimising impacts to the local community. Several key interface meetings have been established to coordinate construction activities:

1. Elizabeth Drive Construction Coordination Group meet on a fortnightly basis to discuss upcoming work schedules, OOHW, program efficiencies, sharing of information, etc
2. Sydney Metro – Western Sydney Airport Communication Interface Coordination Group who meet on a fortnightly basis. This group includes communications specialists whose goal it is to ensure the major projects working in the area coordinate messages and work activities if possible, and to manage and plan for cumulative impacts that are likely to be sensitive to the community during the construction phase of the projects
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 between M12 East, West and Central construction contractors as required.

CPBGG JV will attend meetings as requested by relevant parties (listed above).

CPBGG JV will ensure works will be scheduled with the aim of minimising concurrent works near sensitive receivers. This will include:

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

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

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

7 Construction noise and vibration assessment

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

7.1 Construction activities

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

Table 7-1 Construction scenarios and associated activities

Scenario reference no.	Construction scenario	Description
1a	Ancillary facility establishment/ decommissioning – Peak impact	<p>Before construction begins, the ancillary facilities will need to be prepared to allow construction works to occur. The works will vary depending on location and the existing conditions but could include:</p> <ul style="list-style-type: none"> • Minor clearing • Minor earthworks • Installation of office accommodation • Utilities • Amenities • Secure perimeter fencing, including visual screening of construction ancillary facilities where necessary <p>Highly noise intensive works will be required at certain times and will include the use of excavators and front-end loaders.</p>
1b	Ancillary facility establishment/ decommissioning – Typical impact	
2a	Ancillary facilities – Operation	<p>The ancillary facilities will generally comprise:</p> <ul style="list-style-type: none"> • 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 plants are currently proposed to be located at AF 2, AF 3, AF 4 and AF 10. The location of the batching plant has been assumed to be all of AF 10 and in the centre of AF 2 and AF 3. • Crushing, grinding and screening operations are currently proposed to be located at AF 1, AF 2 and AF 10. <p>The site layout of all ancillary facilities is considered indicative and will be confirmed as the project progresses.</p> <ul style="list-style-type: none"> • Bridge construction support areas • Workshops with appropriate safety and environmental controls for servicing plant and equipment. <p>The operation of all ancillary sites has been assessed for 24/7 operation. It should be noted that the assessment does not include any source mitigation or localised screening which will be investigated by CPBGG JV following confirmation of the site layout.</p>
2b	Ancillary facilities – Stockpiling	
2c	Ancillary facilities – Batching plant	
2d	Ancillary facilities – Crushing activities	
3a	Utilities and drainage - including relocation of existing - Peak impact	<p>The Project will require the construction of new drainage infrastructure and alterations to existing drainage. Construction of drainage works will involve localised excavation, compaction and installation of drainage pipes and pits, and construction of table drains and temporary construction sediment basins. High noise</p>
3b	Utilities and drainage - including relocation of existing - Typical impact	

Scenario reference no.	Construction scenario	Description
		impact works will be required at certain times and will include the use of rock-breakers.
4a	Demolition - bridges and buildings (including breaker)	<p>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:</p> <ul style="list-style-type: none"> • Buildings, sheds or farm infrastructure that fall within the construction footprint. • A bridge crossing South Creek on private property. <p>Peak noise impact works will be required at certain times and will include the use of rock-breakers.</p>
4b	Demolition - bridges and buildings (no breaker)	
5a	Clearing - Peak impact	<p>Vegetation and topsoil will be stripped before earthworks are carried out. This is likely to involve:</p> <ul style="list-style-type: none"> • Removal of vegetation • Topsoil stripping <p>Peak noise impact works will be required at certain times and will include the use of chainsaws and chippers.</p>
5b	Clearing - Typical impact	
6a	Earthworks - Peak impact	<p>Earthworks will be required along the entire length of the project for:</p> <ul style="list-style-type: none"> • 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. <p>Peak noise impact works will be required at certain times and will include the use of dozers or graders.</p>
6b	Earthworks - Typical impact	
6c	Earthworks - onsite truck haulage	Onsite haulage will be required to move spoil between areas of the site as required. These activities have the potential to cause impacts as the truck travel between the various sites within the construction footprint.
7a	Bridge works - Peak impact (including piling)	<p>Construction of the bridges will generally involve:</p> <ul style="list-style-type: none"> • 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. <p>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.</p>
7b	Bridge works - Typical impact	
7c	Bridge works - concrete works	
7d	Bridge works - girder lifts over existing roads	
8a	Road works - concrete works	<p>Road works will generally include the surfacing and concrete/asphalt works associated with the construction of the road surface. Road works involving the tie-in works to existing roads at the M7 Interchange, Elizabeth Drive at Airport Road, Wallgrove Road will likely be required to occur outside of standard hours. Additionally, works around the private access road along Luddenham Road, bike path connection into Elizabeth Drive near Mamre Road and utility access road will likely be required to occur outside of standard hours. Peak noise impact works will be required at certain times and will include the use of concrete saws.</p>
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 to complete the project and include activities such as line marking, installing signs, etc Installation and finishing work generally have no requirement for peak noise impact equipment.

7.2 Construction noise impacts

7.2.1 General construction noise impacts

A summary of the potential impacts to receivers for each NCA from standard hours (daytime) and out-of-hours construction scenarios are presented in Table 7-2 to Table 7-6.

The construction impacts presented in Table 7-2 to Table 7-6 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 5-4 in this Plan) and demonstrates the requirement (or not) for additional mitigation measures.

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

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

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			
				NCA07 Central and West	NCA08 West	NCA09 West	NCA10 West
Morning Shoulder	1a	Ancillary facility establishment	Peak impact	Highly Intrusive (>25dB)	Clearly Audible (5dB to 15dB)	Moderately Intrusive (15dB to 25dB)	Moderately Intrusive (15dB to 25dB)
	1b		Typical impact	Noticeable (<5dB)	Clearly Audible (5dB to 15dB)	Clearly Audible (5dB to 15dB)	
	2a	Ancillary facilities operations	Operation	Moderately Intrusive (15dB to 25dB)	Noticeable (<5dB)	Noticeable (<5dB)	Clearly Audible (5dB to 15dB)
	2b		Stockpiling	Highly Intrusive (>25dB)	Noticeable (<5dB)	Clearly Audible (5dB to 15dB)	Moderately Intrusive (15dB to 25dB)
	2c		Batching plant	Moderately Intrusive (15dB to 25dB)	Clearly Audible (5dB to 15dB)	Noticeable (<5dB)	Clearly Audible (5dB to 15dB)
	2d		Crushing works	Moderately Intrusive (15dB to 25dB)	Clearly Audible (5dB to 15dB)	Noticeable (<5dB)	Moderately Intrusive (15dB to 25dB)
	3a	Utilities and drainage	Peak impact	Highly Intrusive (>25dB)	Moderately Intrusive (15dB to 25dB)	Moderately Intrusive (15dB to 25dB)	Moderately Intrusive (15dB to 25dB)
	3b		Typical impact	Highly Intrusive (>25dB)	Clearly Audible (5dB to 15dB)	Clearly Audible (5dB to 15dB)	Noticeable (<5dB)
	4a	Demolition	Peak impact	Highly Intrusive (>25dB)	Clearly Audible (5dB to 15dB)	Noticeable (<5dB)	Moderately Intrusive (15dB to 25dB)
	4b		Typical impact	Moderately Intrusive (15dB to 25dB)	Noticeable (<5dB)	Noticeable (<5dB)	Noticeable (<5dB)
	5a	Clearing	Peak impact	Highly Intrusive (>25dB)	Moderately Intrusive (15dB to 25dB)	Moderately Intrusive (15dB to 25dB)	Clearly Audible (5dB to 15dB)
	5b		Typical impact	Highly Intrusive (>25dB)	Clearly Audible (5dB to 15dB)	Clearly Audible (5dB to 15dB)	Noticeable (<5dB)
	6a	Earthworks	Peak impact	Highly Intrusive (>25dB)	Moderately Intrusive (15dB to 25dB)	Moderately Intrusive (15dB to 25dB)	Clearly Audible (5dB to 15dB)
	6b		Typical impact	Highly Intrusive (>25dB)	Clearly Audible (5dB to 15dB)	Clearly Audible (5dB to 15dB)	Noticeable (<5dB)
	6c		Onsite truck haulage	Noticeable (<5dB)	Noticeable (<5dB)	Noticeable (<5dB)	Noticeable (<5dB)
	7a	Bridge works	Peak impact	Clearly Audible (5dB to 15dB)	Noticeable (<5dB)	Clearly Audible (5dB to 15dB)	Noticeable (<5dB)
	7b		Typical impact	Noticeable (<5dB)	Noticeable (<5dB)	Noticeable (<5dB)	Noticeable (<5dB)
	7c		Concrete works	Clearly Audible (5dB to 15dB)	Noticeable (<5dB)	Noticeable (<5dB)	Noticeable (<5dB)
	7d		Girder lifts	Noticeable (<5dB)	Clearly Audible (5dB to 15dB)	Noticeable (<5dB)	Noticeable (<5dB)
	8a	Road works	Concrete works	Highly Intrusive (>25dB)	Clearly Audible (5dB to 15dB)	Clearly Audible (5dB to 15dB)	Noticeable (<5dB)
8b	Typical works		Highly Intrusive (>25dB)	Noticeable (<5dB)	Clearly Audible (5dB to 15dB)	Noticeable (<5dB)	
8c	Tie-in works		Moderately Intrusive (15dB to 25dB)	Moderately Intrusive (15dB to 25dB)	Noticeable (<5dB)	Noticeable (<5dB)	
9a	Signage, lighting and landscaping	Highly Intrusive (>25dB)	Noticeable (<5dB)	Clearly Audible (5dB to 15dB)	Clearly Audible (5dB to 15dB)		

Legend:
Receiver perception (dB above NML)
 ● Noticeable (<5dB) ● Clearly Audible (5dB to 15dB) ● Moderately Intrusive (15dB to 25dB)
 ● Highly Intrusive (>25dB)

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

Period	ID	Scenario	Activity	Noise Catchment Area			
				NCA07 Central and West	NCA08 West	NCA09 West	NCA10 West
Daytime	1a	Ancillary facility establishment	Peak impact	Highly Intrusive	Clearly Audible	Moderately Intrusive	Moderately Intrusive
	1b		Typical impact	Highly Intrusive	Clearly Audible	Clearly Audible	Clearly Audible
	2a	Ancillary facilities operations	Operation	Moderately Intrusive	Clearly Audible	Clearly Audible	Clearly Audible
	2b		Stockpiling	Highly Intrusive	Clearly Audible	Clearly Audible	Moderately Intrusive
	2c		Batching plant	Moderately Intrusive	Clearly Audible	Clearly Audible	Clearly Audible
	2d		Crushing works	Moderately Intrusive	Clearly Audible	Clearly Audible	Moderately Intrusive
	3a	Utilities and drainage	Peak impact	Highly Intrusive	Moderately Intrusive	Moderately Intrusive	Moderately Intrusive
	3b		Typical impact	Highly Intrusive	Clearly Audible	Clearly Audible	Clearly Audible
	4a	Demolition	Peak impact	Highly Intrusive	Clearly Audible	Clearly Audible	Moderately Intrusive
	4b		Typical impact	Moderately Intrusive	Clearly Audible	Clearly Audible	Clearly Audible
	5a	Clearing	Peak impact	Highly Intrusive	Moderately Intrusive	Moderately Intrusive	Clearly Audible
	5b		Typical impact	Highly Intrusive	Clearly Audible	Clearly Audible	Clearly Audible
	6a	Earthworks	Peak impact	Highly Intrusive	Moderately Intrusive	Moderately Intrusive	Clearly Audible
	6b		Typical impact	Highly Intrusive	Clearly Audible	Clearly Audible	Clearly Audible
	6c		Onsite truck haulage	Clearly Audible	Clearly Audible	Clearly Audible	Clearly Audible
	7a	Bridge works	Peak impact	Clearly Audible	Clearly Audible	Clearly Audible	Clearly Audible
	7b		Typical impact	Clearly Audible	Clearly Audible	Clearly Audible	Clearly Audible
	7c		Concrete works	Clearly Audible	Clearly Audible	Clearly Audible	Clearly Audible
	7d		Girder lifts	Clearly Audible	Clearly Audible	Clearly Audible	Clearly Audible
	8a	Road works	Concrete works	Highly Intrusive	Clearly Audible	Clearly Audible	Clearly Audible
8b	Typical works		Highly Intrusive	Clearly Audible	Clearly Audible	Clearly Audible	
8c	Tie-in works		Moderately Intrusive	Moderately Intrusive	Clearly Audible	Clearly Audible	
9a	Signage, lighting and landscaping	Highly Intrusive	Clearly Audible	Clearly Audible	Clearly Audible		

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

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			
				NCA07 Central and West	NCA08 West	NCA09 West	NCA10 West
Evening Shoulder	1a	Ancillary facility establishment	Peak impact	Highly Intrusive	Clearly Audible	Moderately Intrusive	Moderately Intrusive
	1b		Typical impact	Highly Intrusive	Clearly Audible	Clearly Audible	Clearly Audible
	2a	Ancillary facilities operations	Operation	Moderately Intrusive	Clearly Audible	Clearly Audible	Clearly Audible
	2b		Stockpiling	Highly Intrusive	Clearly Audible	Clearly Audible	Moderately Intrusive
	2c		Batching plant	Moderately Intrusive	Clearly Audible	Clearly Audible	Clearly Audible
	2d		Crushing works	Moderately Intrusive	Moderately Intrusive	Clearly Audible	Moderately Intrusive
	3a	Utilities and drainage	Peak impact	Highly Intrusive	Highly Intrusive	Highly Intrusive	Moderately Intrusive
	3b		Typical impact	Highly Intrusive	Moderately Intrusive	Moderately Intrusive	Clearly Audible
	4a	Demolition	Peak impact	Highly Intrusive	Clearly Audible	Clearly Audible	Moderately Intrusive
	4b		Typical impact	Moderately Intrusive	Clearly Audible	Clearly Audible	Clearly Audible
	5a	Clearing	Peak impact	Highly Intrusive	Moderately Intrusive	Moderately Intrusive	Clearly Audible
	5b		Typical impact	Highly Intrusive	Clearly Audible	Clearly Audible	Clearly Audible
	6a	Earthworks	Peak impact	Highly Intrusive	Moderately Intrusive	Moderately Intrusive	Clearly Audible
	6b		Typical impact	Highly Intrusive	Clearly Audible	Clearly Audible	Clearly Audible
	6c		Onsite truck haulage	Clearly Audible	Clearly Audible	Clearly Audible	Clearly Audible
	7a	Bridge works	Peak impact	Clearly Audible	Clearly Audible	Clearly Audible	Clearly Audible
	7b		Typical impact	Clearly Audible	Clearly Audible	Clearly Audible	Clearly Audible
	7c		Concrete works	Clearly Audible	Clearly Audible	Clearly Audible	Clearly Audible
	7d		Girder lifts	Clearly Audible	Clearly Audible	Clearly Audible	Clearly Audible
	8a	Road works	Concrete works	Highly Intrusive	Clearly Audible	Clearly Audible	Clearly Audible
	8b		Typical works	Highly Intrusive	Clearly Audible	Clearly Audible	Clearly Audible
8c	Tie-in works		Moderately Intrusive	Moderately Intrusive	Clearly Audible	Clearly Audible	
9a	Signage, lighting and landscaping	Highly Intrusive	Clearly Audible	Moderately Intrusive	Clearly Audible		

Legend:

Receiver Perception (dB above NML)

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

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

Period	ID	Scenario	Activity	Noise Catchment Area			
				NCA07 Central and	NCA08 West	NCA09 West	NCA10 West
Evening	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 (<5dB)
- Clearly Audible (5dB to 15dB)
- Moderately Intrusive (15dB to 25dB)
- Highly Intrusive (>25dB)

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

Period	ID	Scenario	Activity	Noise Catchment Area			
				NCA07 Central and West	NCA08 West	NCA09 West	NCA10 West
Night-time	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 (<5dB) ● Clearly Audible (5dB to 15dB) ● Moderately Intrusive (10dB 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	NCA07 Central and West	NCA08 West	NCA09 West	NCA10 West
Ancillary facility establishment	Peak impact				
Utilities and drainage	Peak impact	1			
Clearing	Peak impact	1			
Earthworks	Peak impact	1			
Road works	Peak impact				

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:

- ‘Other’ sensitive receivers in the study area are not expected to be impacted by construction of the project.

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

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

- 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 Project 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) will be identified in the CPBGG JV’s Site Establishment Management Plans (SEMP), prepared in accordance with NSW CoA A16. The SEMP’s will be prepared prior to the establishment of any ancillary facility (other than minor ancillary facilities) and included as part of the CPBGG JV’s CEMP’s.

The SEMP’s will detail all sites intended for use as ancillary facilities for the Project. Any additional ancillary facilities identified for the Project that have not been assessed in the Environmental Assessment Documentation will be assessed in accordance with the criteria in NSW CoA A15, using the ancillary facilities assessment provided in Appendix A4 of the CEMP.

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

In general, ancillary facilities will be positioned in cleared or otherwise disturbed areas, away from sensitive receivers, heritage sites, vegetation and to minimise impacts on light and noise effects on adjacent receivers and surface water flow lines wherever possible.



Project construction boundary (CA for West and Central, Jul 2021; ARSR for East, Dec 2020)

M12 West

The refined project ancillary facilities (CA for West and Central, Jul 2021; ARSR for East, Dec 2020)

Project exclusion zones

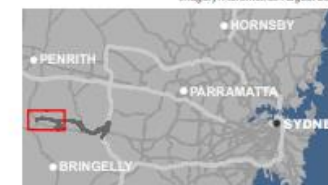
Existing road

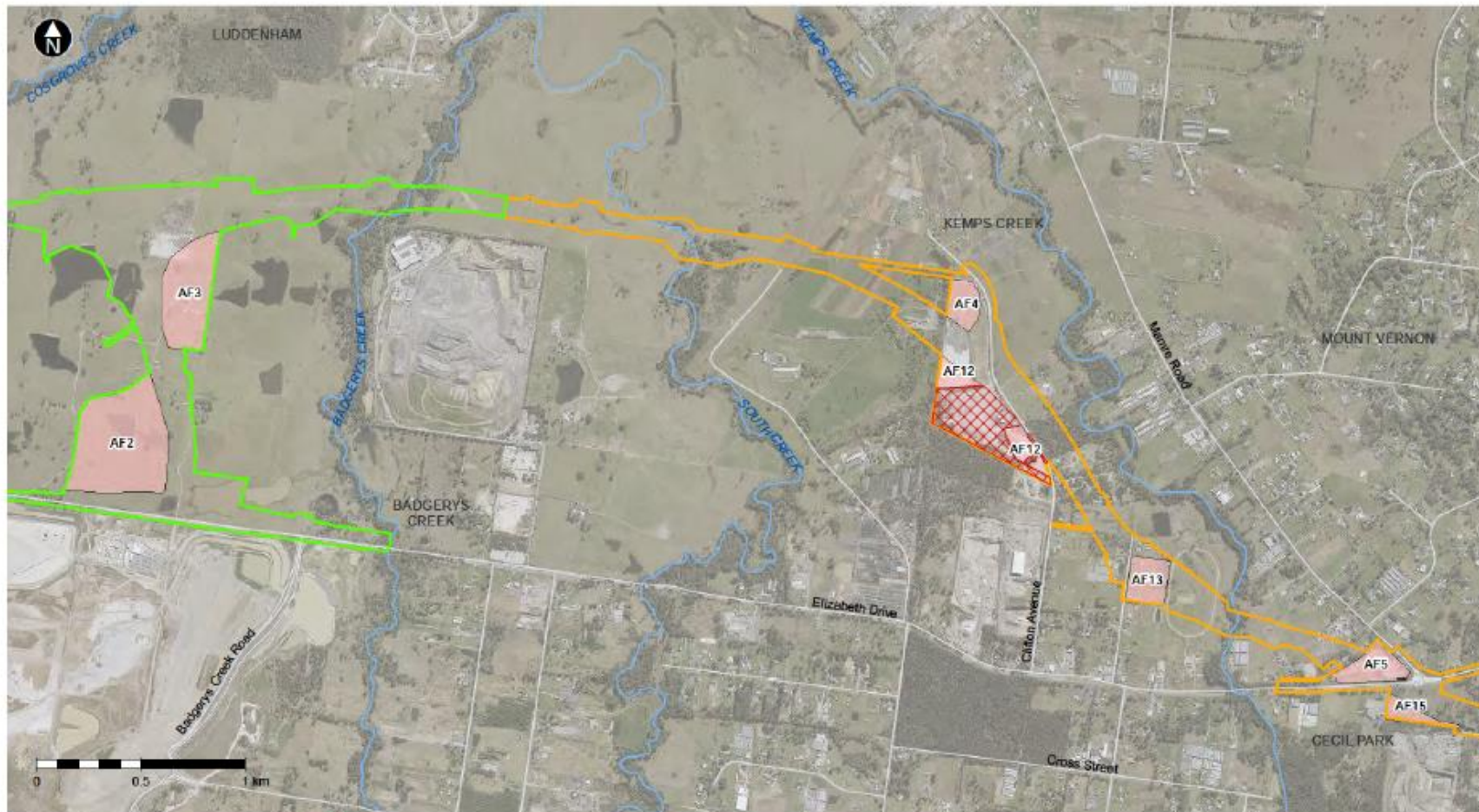
Waterways



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Imagery: Aerometrix August 2020





Project construction boundary (CA for West and Central, Jul 2021; ARSR for East, Dec 2020)

 The amended project exclusion zones
 Existing road
 Waterways

 M12 West
 M12 Central
 Ancillary facility

Imagery: Aeronetree August 2020

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Figure 7-1 Location of ancillary facilities

File: J:\02021\Proj - 20.0000303606\GIS\CA_Construction_Management\2021\02021_2020_M12_Central_Ancillary_Facilities_2020.mxd
Created by: J. G. T. G. T. G. T.

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, CPBGG JV will complete an assessment once detailed vehicle movements are confirmed. In the event that an increase greater than 2 dB(A) is predicted, existing road traffic noise levels will be further evaluated by CPBGG JV to determine if the receiver is also above the relevant RNP base criteria. If the receiver is above the RNP base criteria and predicted to experience an increase in noise greater than 2 dB(A) from construction traffic, mitigation options will be required to be further investigated by CPBGG JV.

7.2.4 Operational Noise Treatments

Noise modelling was undertaken in the ARSR to determine operational noise treatment options. The assessment concluded that diamond grind continuous reinforced concrete pavement and at-property treatments will be provided for operational noise mitigation. This pavement type would reduce the overall noise levels by approximately 3 dB when compared to plain concrete as previously reported in the EIS and Amendment Report. Further noise modelling will continue to be completed during detailed design to confirm operational noise mitigation measures and this will be included within the Operational Noise Review (ONR).

In accordance with NSW CoA E53, where the NML is likely to be exceeded, mitigation must be implemented within six months of the commencement of construction in the vicinity of the impacted receivers to minimise construction noise impacts, unless otherwise agreed with the Planning Secretary. As such, TfNSW has progressed detailed design to determine which properties qualify for at-property treatment. This is currently being finalised through the development of an Operational Noise Review (ONR) by GHD (2021) for M12 Central and M12 West; Appendix G of the Amendment Report details the current at-property treatment mitigation for M12 East.

TfNSW has engaged a suitably qualified consultant to install at-property treatment as they are confirmed at impacted properties within 6 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 in M12 West and M12 Central.

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 West and Central

Treatment Package	Exceedances of criteria, dBA	Affected M12 West residential properties	Affected M12 Central residential properties	Affected M12 Central non-residential properties
Type 1	1-5	13	64	1
Type 2	6-8	5	55	2
Type 3	9-11	4	42	1
Type 4	12-14	3	23	2
Type 5	>14	0	15	2
Total	-	25	199	8

Where at-property treatment cannot be installed within six months of the commencement of construction, a report justifying why operational noise mitigation measures will not be implemented will be provided to DPE in accordance with NSW CoA E55. This will include details of the temporary measures to be

implemented to reduce construction noise impacts, until such time that the operational noise mitigation measures will be implemented. All temporary measures will be implemented within six months of the commencement of construction in the vicinity of the impacted receivers.

In accordance with NSW CoA E54, if the ONR for M12 East is not completed within six months of commencement of construction as per NSW CoA E53, the at-property operational noise mitigation measures must be consistent with the measures and the properties identified in Section 7.2 of Appendix G in the M12 Motorway Amendment Report.

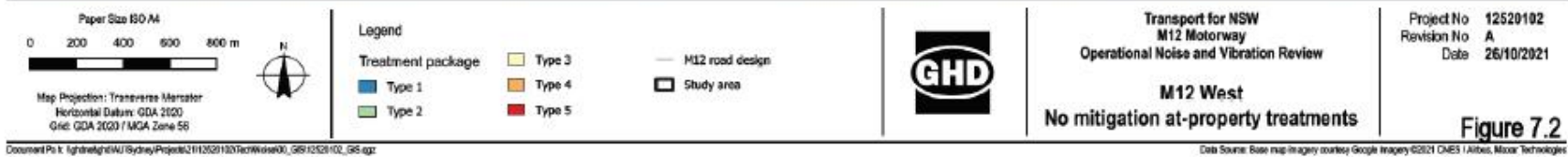


Figure 7-2 No mitigation at-property treatments

7.3 Construction vibration impacts

7.3.1 Construction vibration assessment

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

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

The main sources of vibration during construction of the Project will be associated with the use of vibratory rollers, rock breakers and compaction. A large vibratory roller produces noticeable vibration and is likely to be used throughout the construction of the Project. It is expected that vibration impacts will be able to be controlled to avoid cosmetic and structural damage to all structures. Where works are within the minimum working distances of structures, a detailed review of the required construction methods will be completed and attended vibration measurements will be required at the start of the works to determine the risk of exceeding the vibration objectives.

The distance between the construction works and the nearest sensitive receivers is generally sufficient for most buildings not to suffer cosmetic damage. However, five (5) structures where receivers are located close to the works are located within the recommended minimum working distance, two (2) of which are a shed / garage type structure.

Detailed heritage assessments carried out for the Project as part of the EIS identified three (3) heritage items as being potentially impacted by vibration:

- McGarvie-Smith farm
- The Fleur radio telescope site
- McMasters field station

Where these heritage structures are located within or near the project boundary, they may be susceptible to vibration impacts associated with construction equipment if they are operating within the safe working distance for heritage sensitive receivers indicated in table 5-9.

Where works are within the safe 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.

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

A range of environmental requirements and management measures are identified in the Environmental Assessment Documentation, the CoA and relevant TfNSW documents.

The standard mitigation measures as outlined in the TfNSW CNVG (2016) have been included in the management and mitigation measures in Table 8-1 and generally include:

- Behavioral practices on site (eg. NV3, NV17)
- Equipment selection / Maintaining and monitoring plant (eg. NV10, NV11, NV21, NV22, NV39)
- Use and siting of plant and hoardings (eg. NV12, NV14, NV15, NV16, NV20, NV43)
- Site inductions (eg. NV1, NV2)
- Use of non-tonal reversing alarms (eg. NV13)
- Notification and consultation (eg. NV23, NV34)
- Mitigating cumulative impacts and planning noisier work to be carried out earlier in the period (eg. NV32, NV33, NV35)
- Implementation of at-property treatment for operation noise mitigation which is a TfNSW responsibility (eg. NV18, NV44)

Specific measures and requirements to address noise and vibration impacts are outlined in Table 8-1.



Table 8-1 Noise and vibration management and mitigation measures

ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
NV1	All employees, contractors and subcontractors are to receive a Project induction prior to commencing work on site. The induction will include: <ul style="list-style-type: none"> • 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	CPBGG JV's ESR	Standard industry practice	Induction records
NV2	Training will be provided to relevant Project personnel, including relevant subcontractors, on noise and vibration requirements from this Plan, toolboxes or targeted training	Prior to Construction Construction	CPBGG JV's ESR	Standard industry practice G36	Training records Toolbox talk sign on sheets
NV3	No swearing or unnecessary shouting or loud stereos / radios on site. Dropping of materials from height, throwing of metal items and slamming of doors will also be avoided	Construction	CPBGG JV's Foreman / Site Supervisor	Standard industry practice	Site inspection records Toolbox talks
NV4	No blasting will be undertaken.	Construction	CPBGG JV's Foreman / Site Supervisor	NSW CoA E49	Site inspection records Toolbox talks
NV5	A noise screening assessment will be carried out for ancillary facilities with the potential to involve high noise generating activities. Should OOHW be required, an NVIS would be developed.	Prior to construction	CPBGG JV's ESR	REMM NV03	Noise modelling outputs
NV6	A Construction Noise and Vibration Monitoring Program will be developed and implemented.	Prior to construction	CPBGG JV's ESR	NSW CoA C11(a) NSW CoA C14	Appendix A Monitoring records
NV7	Monitoring will be carried out at the start of high noise and vibration activities (such as piling, rock-breaking, vibratory rolling and concrete sawing) to confirm that actual noise and vibration levels are consistent with the noise and vibration impact predictions.	Construction	CPBGG JV's ESR	REMM NV04	Monitoring records



ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
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	CPBGG JV's Construction Manager CPBGG JV's ESR	REMM NV04	Monitoring records 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	PLO CPBGG JV's Construction Manager	REMM NV10	Consultation records Construction documentation
NV10	All construction plant and equipment used on site will be fitted with properly maintained noise suppression devices in accordance with the manufacturer's specifications	Construction	CPBGG JV's Foreman / Site Supervisor	G36	Plant inspection records
NV11	All construction plant and equipment used on the site will be maintained in an efficient condition, in accordance with the manufacturers' specification. If a piece of plant or equipment is found to exceed the noise levels included in modelling, the following will occur: <ul style="list-style-type: none"> • 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	CPBGG JV's Foreman / Site Supervisor	G36	Plant inspection records Site inspection records
NV12	All construction plant and equipment used on the site will be operated in a proper and efficient manner.	Construction	CPBGG JV's Foreman / Site Supervisor	G36	Site inspection records Safety inspection records EWMS Toolbox talk record
NV13	Non-tonal (white noise) movement alarms will be used in place of tonal reversing alarms for Contractor owned plant and subcontract plant used at night or during the day.	Construction	CPBGG JV's Foreman / Site Supervisor	G36	Site inspection records EWMS Toolbox talk record
NV14	Plant and machinery will be switched off when it is not in use for more than 15 minutes	Construction	CPBGG JV's Foreman / Site Supervisor	G36	Induction records EWMS Pre-start briefing



ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
NV15	Stationary noise sources will be enclosed or shielded where reasonable and feasible. This will apply to plant and equipment such as generators, stationary concrete cutters, stationary asphalt corers, stationary vacuum trucks, and stationary jack hammers	Construction	CPBGG JV's Foreman / Site Supervisor	Standard industry practice	Site inspection records EWMS
NV16	Additional temporary screening or enclosures will be considered for plant and equipment where additional measures are required to meet relevant NMLs, or where plant and equipment is known to exceed the NMLs	Construction	CPBGG JV's Foreman / Site Supervisor	Standard industry practice	Site inspection records EWMS
NV17	Construction vehicle movements (both on and offsite) will be managed to minimise noise impacts including (but not be limited to): <ul style="list-style-type: none"> Establishment and use of internal haul routes, or existing major roads where this is not feasible Restriction of heavy vehicle movements to standard construction hours Locating traffic marshalling areas away from residences to minimise noise impacts from idling vehicles Instructing workers on the operation of heavy vehicles entering and exiting the site to minimise noise. 	Prior to Construction During Construction	CPBGG JV's Construction Manager CPBGG JV's Foreman / Site Supervisor	REMM NV12	Site inspections Construction TMP
NV18	Where reasonable and feasible, receivers identified as requiring at-property treatment for operational noise mitigation will be identified and offered treatment before construction activities begin that are likely to impact them.	Prior to Construction	PLO CPBGG JV's ESR	REMM NV05	Consultation records OOHW Protocol
NV19	Consideration will be given to at-property noise mitigation at receivers impacted by ancillary facilities subject to the results of the noise assessments	During construction	CPBGG JV's Construction Manager	REMM NV03	Monitoring records Consultation records Construction documentation
NV20	Appropriate safe working distances will be implemented to avoid impacts on structures and sensitive receivers during activities that generate vibrations.	Construction	CPBGG JV's Construction Manager CPBGG JV's ESR	REMM NV06	Site inspection records
NV21	The use of alternatives to vibration generating equipment will be considered where vibration impacts are predicted.	Construction	CPBGG JV's Construction Manager CPBGG JV's ESR	REMM NV07	Construction documentation
NV22	Where works are within the minimum working distances and considered likely to exceed the cosmetic damage objectives, construction works will not proceed unless:	Construction	CPBGG JV's Construction Manager	REMM NV08	Construction documentation



ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
	<ul style="list-style-type: none"> 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. 		CPBGG JV's ESR		
NV23	Properties at risk of exceeding the screening criteria for cosmetic damage will be notified before vibrating works. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owners and occupiers will be provided a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances	Construction	PLO CPBGG JV's ES	NSW CoA E41	Consultation records
NV24	Vibration testing will be carried out before and during vibration generating activities that have the potential to impact on heritage items to identify minimum working distances to prevent cosmetic and structural damage. In the event that the vibration testing and monitoring shows that the preferred values for vibration are likely to be exceeded, the construction methodology will be reviewed and, if necessary, amended and/or implement additional mitigation measures implemented.	Construction	CPBGG JV's Construction Manager CPBGG JV's ESR	NSW CoA E42	Monitoring results Construction documentation
NV25	Advice from a heritage specialist will be implemented on methods and locations for installing equipment used for vibration, movement and noise monitoring at heritage-listed structures prior to installing such equipment.	Construction	CPBGG JV's ESR	NSW CoA E43	Heritage specialists report
NV26	Advice from a suitably qualified and experienced built heritage specialist will be obtained and implemented before conducting at-property treatment on heritage items.	Construction	CPBGG JV's ESR	NSW CoA E44	Heritage specialists report
NV27	Prior to the commencement of vibration generating works that could impact on the structure/asset, a suitably qualified person will complete a Pre-Construction Survey to the owners of surface and sub-surface structures and other relevant assets identified at risk from vibration (where the offer is accepted).	Building inspector Landowner list	CPBGG JV's ESR	NSW CoA E76 REMM NV09	Pre-Construction Survey Report
NV28	After completion of the works, post-condition surveys of all structures/assets (including but not limited to utility assets, heritage items and building/structures of heritage significance) for which Pre-Construction Condition Surveys were undertaken, will be completed by a suitably qualified and experienced person (engineer and/or building surveyor). The results of the surveys will be documented in a Post-Construction Condition	Building inspector Landowner list	CPBGG JV's ESR	NSW CoA E77	Post-Construction Survey Report



ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
	Survey Report 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.				
NV29	<p>The following structures have the potential to be within the safe working distances for sensitive structures (Group 3 from DIN 4150):</p> <ul style="list-style-type: none"> Item 1: McGarvie Smith Farm Item 2: Fleurs Radio Telescope Site Item 6: McMaster Field Station <p>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.</p>	Prior to construction	PLO CPBGG JV's ESR	REMM NV11	Consultation records Monitoring records
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	PLO CPBGG JV's Construction Manager	NSW CoA E56	Consultation records Construction documentation
NV31	Measures to minimise and manage construction fatigue will be investigated through the planning of construction staging.	Prior to construction	CPBGG JV's Construction Manager CPBGG JV's ESR	REMM NV02	Construction documentation
NV32	Work, including those by third-parties, will be coordinated to ensure respite periods are provided.	Construction	CPBGG JV's Construction Manager CPBGG JV's ESR	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. The offers of other reasonable arrangements will be implemented at no cost to the affected institution.	Construction	CPBGG JV's Construction Manager CPBGG JV's ESR	NSW CoA E39	Construction documentation



ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
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 will be carried out throughout construction.	Construction	PLO CPBGG JV's ESR CPBGG JV's Construction Manager	REMM NV13	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	CPBGG JV's ESR	NSW CoA E40	NVIS
NV36	Crushing and grinding will only be undertaken during the following hours: <ul style="list-style-type: none"> 7:00 am to 6:00 pm Mondays to Fridays, inclusive; 8:00 am to 6:00 pm Saturdays; and 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	CPBGG JV's ESR	NSW CoA E48	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: <ul style="list-style-type: none"> 10:00 pm and 7:00 am, Monday to Friday; 10:00 pm Saturday to 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 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	PLO CPBGG JV's 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	PLO CPBGG JV's ESR	NSW CoA E47	Consultation records
NV39	Select the smallest rock hammers capable of efficiently completing the work, where feasible and reasonable.	Construction	CPBGG JV's Construction Manager	Standard industry practice	Site inspections records
NV40	Boundary screening will be erected around all construction ancillary facilities that are adjacent to sensitive receivers.	Construction	CPBGG JV's Construction Manager	NSW CoA A21	Site inspections records



ID	Management Measure	When to implement	Responsibility for Implementation	Reference or source	Evidence of implementation
NV41	<p>An Operational Noise Review will be prepared for all Project stages to assess and confirm mitigation measures.</p> <p>Operational noise mitigation measures including at-property treatment will be implemented where the NML is likely to be exceeded and will occur within six months of the commencement of construction in the vicinity of the impacted residences, unless otherwise agreed with the Planning Secretary.</p>	ONR must be submitted to DPE prior to implementing at-property treatment	TfNSW	NSW CoA E52 NSW CoA E53	Section 7.2.4 Consultation records Operational Noise Review
NV42	If the ONR for M12 East is not completed within the six months of commencement of construction as per NSW CoA E53, the at-property operational noise mitigation measures and the properties identified in Section 7.2 of Appendix G in the M12 Motorway Amendment Report.	Prior to construction and within first six months of commencement of construction	TfNSW	NSW CoA E54	Section 7.2.4 Consultation records Operational Noise Review
NV43	All requests to the Planning Secretary where the NML is likely to be exceeded at receivers will be accompanied with a report justifying why operational noise mitigation measures required will not be implemented within six months. This report will include details of the temporary measures to be implemented to reduce construction noise impacts and until such time the operational noise mitigation measures will be implemented. All temporary measures will be implemented within six months of the commencement of construction in the vicinity of the impacted receivers. The report will be submitted to the Planning Secretary before the commencement of construction which will affect the identified residences.	Prior to construction and within first six months of commencement in the vicinity of the impacted residences	TfNSW	NSW CoA E55	Section 7.2.4 Consultation records Operational Noise Review
NV44	CPBGGJV to inform TfNSW of the M12 West 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.	Monthly	TfNSW CPBGG JV	NSW CoA E53- E55	Monthly Report

9 Compliance management

9.1 Roles and responsibilities

The Project's organisational structure and overall roles and responsibilities are outlined in Section 3.3 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Section 8 of this NVMP.

9.2 Communication

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

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

- Good engagement with the community will be maintained to facilitate effective Project delivery with consideration of community impact, including procedures for notifying residents, business owners and other sensitive receivers, of any noise- or 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 Project
- 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 TfNSW, the CPBGG JV and the sensitive receiver have made other arrangements (at no cost to the affected receiver) or the Secretary has otherwise approved the works.

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

Further detail about the OCS is provided in Section 3.7 of the CEMP. Community consultation methods relating to OOHV are contained in the OOHV Procedure (Appendix B).

9.3 Complaints management

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

CPBGG JV will have the following information available to facilitate complaints and will be accessible to the community:

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

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

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

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

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

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

CPBGG JV will advise each complainant of the results of its investigation of their complaint and any proposed remedial action.

Further details on Complaints Management is provided in section 3.7 of the CEMP.

9.4 Training

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

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

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

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

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

Further details regarding staff induction and training are outlined in Section 3.5.1 of the CEMP.

9.5 Inspection and monitoring

9.5.1 Monitoring

NSW CoA C11 requires that Construction Monitoring Programs to be prepared in consultation with the relevant government agencies identified for each to compare actual performance of construction against the performance predicted to inform management measures. This includes the development of a Construction Noise and Vibration Monitoring Program. The Construction Noise and Vibration Monitoring Program has been prepared in accordance with NSW CoA C11, C13, C14 and EPL conditions M4.1, M4.2, M4.3 and M4.4 and is provided in Appendix A.

Monitoring will include, but not be limited to:

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

Further details of monitoring requirements for the Project are presented in Section 3.9 of the CEMP.

9.5.2 Inspections

Regular inspections of sensitive areas and activities will occur for the duration of the Project. The CPBGG JV's ESR will carry out weekly site inspections. TfNSW will also conduct independent inspections to confirm the CPBGG JV's compliance with noise and vibration management requirements. Weekly and other routine inspections by the TfNSW ESM (or delegate), Environmental Review Group (ERG) representatives and the ER will occur throughout construction. Detail on the nature and frequency of these inspections are documented in Section 3.9.1 of the CEMP.

9.6 Incident planning and response

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

9.7 Auditing

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

Audit requirements are detailed in Section 3.9.3 of the CEMP.

9.8 Non-conformance

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

Where a non-conformance is detected or monitoring results directly attributable to the Project exceed the target set in the Construction Noise and Vibration Monitoring Program, the process described in the Monitoring Program and Section 3.9 of the CEMP will be implemented. The CPBGG JV's Quality Plan will describe the process for managing non-conforming work practices and initiating corrective / preventative actions or system improvements in accordance with the process outlined in Section 3.10 of the CEMP.

9.9 Reporting and identified records

CPBGG JV will prepare monthly environmental reports (by the 10th day of each month) and quarterly construction monitoring reports. CPBGG JV will be required to maintain accurate records substantiating all construction activities associated with the Project or relevant to the conditions of approval, including measures taken to implement this Plan. Records will be made available to the DPE and DAWE upon request, within the timeframe nominated in the request. Refer to Section 3.9 of the CEMP for reporting requirements and responsibilities.

9.9.1 NVIS

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

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

9.9.2 OOHW Documentation

OOHW approval documentation (eg. application forms, NVIS, community notification etc) will be prepared to support all OOHW in accordance with NSW CoA E37 and EPL L5.6.

Where OOHW are undertaken which are not subject to an EPL, then the documentation contained in the TfNSW OOHW Protocol will be completed and provided to TfNSW and the ER for review/approval. The ER will assess the risk of the OOHW as either low or high. Where the OOHW works present a low risk, then this can be approved by the ER. High risk OOHW is to be approved by the DPE Planning Secretary, so will need to be provided to DPE.

Where OOHW are to be undertaken subject to an EPL, then the supporting documentation (including NVIS, monitoring plan, community notification and agreements) and application form as outlined in Appendix A are to be completed. This information will be provided to the EPA on request in accordance with L5.6(i). As a courtesy, notification of all OOHW will be provided to the EPA, TfNSW and the ER. Copies of all OOHW supporting documentation will be provided to TfNSW and to the ER.

10 Review and improvement

10.1 Continuous improvement

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

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance
- Identify environmental risks not already included in the risk register
- Determine the cause or causes of non-conformances and deficiencies
- Develop and implement a plan of corrective and preventative action to address any 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 CPBGG JV will be responsible for ensuring Project environmental risks are identified and included in the risk register and appropriate mitigation measures implemented throughout the construction of the Project, as part of the continuous improvement process.

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

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

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

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

10.2 Update and amendment

The processes described in Section 3.13 of the CEMP may result in the need to update or revise this Plan. This will occur as needed.

Any revisions to this Plan will be in accordance with the process outlined in Section 3.13.1 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.

The review and document control processes for this CNVMP is described in Section 3.13 of the CEMP.

Appendix A - Construction Noise and Vibration Monitoring Program

Appendix B - Out of Hours Work Procedure

Appendix C – Secondary CoA / REMMs

CoA

CoA No.	Condition Requirements	Document Reference
A5	<p>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:</p> <ul style="list-style-type: none"> (a) documentation of the engagement with the party identified in the condition of approval that has occurred before submitting the document for approval; (b) a log of the dates of engagement or attempted engagement with the identified party; (c) documentation of the follow-up with the identified party where engagement has not occurred to confirm that they do not wish to engage or have not attempted to engage after repeated invitations; (d) outline of the issues raised by the identified party and how they have been addressed; and (e) a description of the outstanding issues raised by the identified party and the reasons why they have not been addressed. 	Section 1.5
A15	<p>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:</p> <ul style="list-style-type: none"> (a) they are located within or immediately adjacent to the construction boundary; and (b) they are not located next to a sensitive receiver(s) (including where an access road is between the facility and the receiver(s)), unless the sensitive receiver(s) (both the landowner(s) and occupier(s)2) have given written acceptance to the carrying out of the relevant facility in the proposed location; (c) they have no impacts on heritage items (including areas of archaeological sensitivity), threatened species, populations or ecological communities beyond the impacts approved under the terms of this approval; and (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. 	Section 7.2.2
A16	<p>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:</p> <ul style="list-style-type: none"> (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: <ul style="list-style-type: none"> (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 © of this condition; and 	SEMP (Appendix B10 CEMP) Section 7.2.2



CoA No.	Condition Requirements	Document Reference
	<p>(e) a program for monitoring the performance outcomes, including a program for noise monitoring consistent with the requirements of Condition C14.</p> <p>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).</p> <p>Nothing in this condition prevents the Proponent from preparing individual Site Establishment Management Plans for each construction ancillary facility.</p> <p>Note: Condition A16 does not apply to minor construction ancillary facilities established under Condition A20.</p>	
A20	<p>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:</p> <p>(a) are located within or adjacent to the construction boundary; and</p> <p>(b) have been assessed by the ER to ha–e -</p> <p>(i) minor amenity impacts to surrounding residences and businesses, after consideration of matters 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</p> <p>(ii) minor environmental impact with respect to waste management, soil, water and flooding, and</p> <p>(iii) no impacts on heritage items (including areas of archaeological sensitivity), threatened species, populations or ecological communities beyond the impacts approved under the terms of this approval.</p>	SEMP (Appendix B10 CEMP) Section 7.2.2
A21	<p>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.</p>	SEMP (Appendix B10 CEMP) Section 8
B1	<p>A Communication Strategy must be prepared to provide mechanisms to facilitate communication about Work, construction and operation of the CSSI with:</p> <p>(a) the community (including adjoining affected landowners and businesses, and others directly impacted by the CSSI); and</p> <p>(b) the relevant councils and relevant government agencies.</p> <p>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.</p>	OCS Section 9.2
B2	<p>The Communication Strategy must:</p> <p>(a) identify people, organisations, councils and agencies to be consulted during the design and Work phases;</p> <p>(b) identify details of the community demographics;</p> <p>(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;</p> <p>(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;</p> <p>(e) provide for the formation of issue or location-based community forums that focus on key environmental management issues of concern to the relevant community(ies); and</p> <p>(f) set out procedures and mechanis–s -</p>	OCS Section 9.2



CoA No.	Condition Requirements	Document Reference
	<p>(i) through which the community can discuss or provide feedback to the Proponent 24 hours a day, seven days per week;</p> <p>(ii) through which the Proponent will respond to enquiries or feedback from the community; and</p> <p>(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.</p>	
B6	<p>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:</p> <p>(a) the Complaints Register may be forwarded to Government agencies, including the Department, to allow them to undertake their regulatory duties;</p> <p>(b) by providing personal information, the complainant authorises the Proponent to provide that information to government agencies;</p> <p>(c) the supply of personal information by the complainant is voluntary; and</p> <p>(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).</p> <p>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.</p>	Section 9.3
B7	<p>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:</p> <p>(a) 24- hour telephone number for the registration of complaints and enquiries about the CSSI</p> <p>(b) a postal address to which written complaints and enquires may be sent</p> <p>(c) an email address to which electronic complaints and enquiries may be transmitted; and</p> <p>(d) a mediation system for complaints unable to be resolved.</p> <p>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.</p>	Section 9.3
C2	<p>The CEMP must provide:</p>	
	<p>(h) a list of all the CEMP Sub-plans required in respect of construction, as set out in Condition C4. Where staged construction of the CSSI is proposed, the CEMP must also identify which CEMP Sub-plan applies to each of the proposed stages of construction;</p>	Section 1.4
	<p>(k) for periodic review and update of the CEMP and all associated plans and programs; and</p>	Section 10
C5	<p>The CEMP Sub-plans must state how:</p> <p>(a) the environmental performance outcomes identified in the documents listed in Condition A1 will be achieved;</p> <p>(b) the mitigation measures identified in the documents listed in Condition A1 will be implemented;</p> <p>(c) the relevant terms of this approval will be complied with; and</p> <p>(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.</p>	Section 2.3 Section 6.3 Section 8

CoA No.	Condition Requirements	Document Reference
C9	Any of the CEMP Sub-plans may be submitted to the Planning Secretary for approval along with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before the commencement of construction.	Section 1.4.1
C10	Construction must not commence until the CEMP and all CEMP Sub-plans have been approved, unless otherwise agreed by the Planning Secretary. The CEMP and CEMP Sub-plans, as approved by the Planning Secretary, including any minor amendments approved by the ER must be implemented for the duration of construction. Where construction of the CSSI is staged, construction of a stage must not commence until the CEMP and sub-plans for that stage have been endorsed by the ER and approved by the Planning Secretary.	Section 1.4.1
C13	Each Construction Monitoring Program must provide: <ul style="list-style-type: none"> (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. 	Appendix A
C15	The Construction Monitoring Programs must be endorsed by the ER and then submitted to the Planning Secretary for approval at least one (1) month before the commencement of construction.	Completed by TfNSW DPE Approval 21/12/2021
C16	Unless otherwise agreed with the Planning Secretary, construction must not commence until all of the relevant Construction Monitoring Programs have been approved by the Planning Secretary, and all relevant baseline data for the specific construction activity has been collected.	Completed by TfNSW DPE Approval 21/12/2021
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 A
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.	Appendix A

REMMs

REMM No.	Condition Requirements	Document Reference
NV02	Measures to minimise and manage construction fatigue are to be investigated through the planning of construction staging.	Section 8
NV03	Detailed noise assessments will be carried out for ancillary facilities with the potential to involve high noise generating activities (including batching plant operations). The assessments will consider the proposed site layouts and noise generating activities that will occur at the facilities and assess predicted noise levels against the relevant noise management criteria. The assessments will also consider the requirement for appropriate noise mitigation within ancillary facilities and adjacent to construction works, depending on the predicted noise levels. Any mitigation measures required will be implemented before the start of activities that generate noise and vibration impacts.	Section 8
NV04	Monitoring will be carried out at the start of high noise and vibration activities to confirm that actual noise and vibration levels are consistent with the noise and vibration impact predictions. Where mitigation measures were included, measurements will be carried out to confirm the effectiveness. Where the monitoring identifies higher levels of noise and vibration compared to predicted levels, or where mitigation is shown to be ineffective against measured noise and vibration levels, additional mitigation measures will be identified and implemented to appropriately manage impacts where feasible and reasonable.	Section 8 Appendix A
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.	Section 8
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.	Section 8
NV07	The use of alternatives to vibration generating equipment will be considered where vibration impacts are predicted.	Section 8
NV08	Where works are within the minimum working distances and considered likely to exceed the cosmetic damage objectives (as shown in Figure 7-3 of Appendix G of the amendment report), construction works will not proceed unless: <ul style="list-style-type: none"> • 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 8 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.	Section 8 Appendix A
NV11	The following structures have the potential to be within the safe working distances for sensitive structures (Group 3 from DIN 4150): <ul style="list-style-type: none"> • Item 1: McGarvie Smith Farm • Item 2: Fleurs Radio Telescope Site • Item 6: McMaster Field Station 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 8 Appendix A



REMM No.	Condition Requirements	Document Reference
NV12	<p>Construction vehicle movements (both on and offsite) will be managed to minimise noise impacts. Where feasible, this will include (but not be limited to):</p> <ul style="list-style-type: none"> • 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. 	Section 8
NV13	<p>The likelihood of cumulative construction noise impacts will be considered during detailed design when detailed construction schedules of other projects are available. Construction works will be scheduled with the aim of minimising concurrent works near sensitive receivers where possible in consultation with managers of other nearby projects that are likely to result in a cumulative impact. This will include the coordination of respite between the various construction projects where receivers are likely to experience concurrent construction impacts where feasible. Coordination between project teams will be carried out throughout construction.</p>	Section 8
CU01	<p>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.</p>	OCS CSEP Section 6.3