

Belmont Desalination Plant

Noise and Vibration Management Sub-Plan

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Revisions and Distribution

Revisions

Draft issues of this document are identified as Revision A, B, C, etc. Upon initial issue this will be changed to a sequential number commencing at Revision 0. Revision numbers will continue at Revision 1, 2, etc.

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2	13/11/2024	B Rice	BR	A Grant J Nisbet Mattia Tabacchi (Renzo Associates)	AG JN	S MacNish	SM	Update Post DPHI Comments

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Terms and Abbreviations

Term/Abbreviation	Definition/Expanded text
ABL	Assessment Background Level – A single-number figure used to characterise the background noise levels from a single day of a noise survey. ABL is derived from the measured noise levels for the day, evening, or night-time period of a single day of background measurements. The ABL is calculated to be the tenth percentile of the background LA90 noise levels, i.e. the measured background noise is above the ABL 90% of the time.
ABN	Airborne noise
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.
AMS	Activity Method Statements
AQMP	Air Quality Management Sub-Plan
Attenuation	The reduction in the level of sound or vibration.
At-property acoustic treatment	Includes courtyard walls and building treatments. Building treatments may include but are not limited to ventilation, acoustic blinds/curtains, glazing, window and door seals, sealing of vents or underfloor areas, shutters and secondary glazing.
AVTG	Assessing Vibration – A Technical Guideline
CS	Communications Strategy
CEMP	Construction Environmental Management Plan
CMP	Construction Monitoring Program
CNVG	Construction Noise and Vibration Guideline (CNVG) (Transport for NSW 2023)
CoA	Conditions of Approval
Construction	All physical work to enable operation including (unless specifically excluded by a condition) but not limited to the carrying out of works for the purposes of the development, including bulk earthworks and erection of buildings and other infrastructure permitted by this approval, but excluding the following: • building and road dilapidation surveys; • investigative drilling or investigative excavation; • Archaeological Salvage; • establishing temporary site offices (in locations identified by the conditions of this approval); • installation of environmental impact mitigation measures, fencing, enabling works; and • minor adjustments to services or utilities However, where heritage items, or threatened species or threatened ecological communities (within the meaning of the Biodiversity Conservation Act 2016 or Environment Protection and Biodiversity Conservation Act 1999) are affected or potentially affected by any physical work, that work is construction, unless otherwise determined by the Planning Secretary in consultation with EES Group or DPIE Fisheries (in the case of impact upon fish, aquatic invertebrates or marine vegetation).
Consultation	To provide information and actively engage with and obtain and consider feedback from stakeholders during development of post approval documents. How the feedback has been considered and whether any changes have been made in response to this feedback is then documented and communicated back to stakeholders. Consultation should not be limited to one-way notification about the project.
Continuously	Includes any period during which there is less than one hour between ceasing and recommencing any of the work.
D&C	Design and Construct
dB(A)	Decibels using the A-weighted scale which is accepted as being representative of the frequency response of the human ear.
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DECCW	Department of Environment Climate Change and Water
DOI	Direct Ocean Intake

Term/Abbreviation	Definition/Expanded text
DPHI	Former Department of Planning, Industry and Environment, now Department of Planning, Housing and Infrastructure
EIS	Environmental Impact Statement
EMS	Environmental Management System
Environmental Assessment Documentation	Hunter Water Corporation Belmont Desalination Plant Environmental Impact Statement, prepared by GHD dated 2019. Hunter Water Corporation Belmont Desalination Plant Amendment Report and Submissions Report prepared by GHD dated 2020. Hunter Water Corporation Belmont Desalination Plant Modification Report Environmental Impact Statement prepared by Jacobs dated 2024. Hunter Water Corporation Belmont Desalination Plant Modification Report – Submissions Report prepared by Jacobs dated 2024
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 incident	An unexpected event that has, or has the potential to, cause harm to the environment and requires some action to minimise the impact or restore the environment.
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	<i>Environmental Planning and Assessment Act 1979</i>
EPA	Environment Protection Authority
EPL	Environment Protection Licence
ER	Environmental Representative
EWMS	Environmental Work Method Statement
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.
GBN	Ground-borne noise
Highly Noise Affected	As defined in the Interim Construction Noise Guideline (DECC, 2009)
Highly noise intensive works/ particularly annoying	Work which is defined as annoying under the ICNG including: use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work. (a) grinding metal, concrete or masonry; (b) rock drilling; (c) line drilling; (d) vibratory rolling; (e) bitumen milling or profiling; (f) jackhammering, rock hammering or rock breaking; and (g) impact piling Note: when modelled, these activities/plant and equipment will incur a 5dB(A) penalty.
HWC	Hunter Water Corporation
HTP	Helicopter Transportation Plan
ICNG	Interim Construction Noise Guideline (DECC, 2009)

Term/Abbreviation	Definition/Expanded text
INP	Industrial Noise Policy
ISCA	Infrastructure Sustainability Council of Australia
JH	John Holland
KHz	Kilohertz
L _{A(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.
L _{Aeq(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.
LA1	The A-weighted sound pressure level that is exceeded for 1 per cent of the time for which the given sound is measured.
LA90	The A-weighted sound pressure level that is exceeded for 10 per cent of the time for which the given sound is measured.
NCA	Noise Catchment Area
NCG	Noise Criteria Guideline
NMG	Noise Mitigation Guideline
NML	Noise Management Level as defined in the Interim Construction Noise Guideline (DECC, 2009)
NPfi	Noise Policy for Industry
NVA	Noise and Vibration Assessment
NVIS	Noise and Vibration Impact Statement
NVMP	Noise and Vibration Management Sub-Plan
ONR	Operational Noise Review
OOHW	Out of Hours Works
OSCWMP	Offshore Construction Works Management Plan
PIRMP	Pollution Incident Response Management Plan
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
PPV	Peak Particle Velocity – the highest velocity of a particle (such as part of a building structure) as it vibrates. Most sound level meters measure root mean squared (RMS) values; it is common to approximate the PPV based on an RMS measurement. PPV is commonly used as a vibration criterion and is often interpreted as a PPV based on the L _{max} or L _{max,spec} index.
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).
REMM	Revised Environmental Management Measures
RMS	Root Mean Squared
RNP	Road Noise Policy
ROL	Road Occupancy Licence
Submissions Report	The Proponent's response to issues raised in the submission received in relation to the application for approval of the SSI under the EP&A Act.
SPL	Sound Pressure Level
SWL	Sound Power Level
Transport	Transport for New South Wales, or TfNSW
VMS	Variable Message Signs
WRA	Work Risk Assessment

Noise and Vibration Management Sub-Plan

Plan Profile

Management System	The Project will use John Holland's Environmental Management System (EMS) and core Project plans to support Project delivery. Additional functional plans have been developed for the Project.
Name	Construction Noise and Vibration Management Sub-Plan (CNVMP)
Authorisation	All personnel employed on the Project will perform their duties in accordance with the requirements of this Plan and in compliance with Project system procedures and any specific Project instructions. This Plan is authorised by the Project Director.
Review and update	This Plan will be regularly reviewed, developed, and updated: • For changes in design or construction sequence, staging, methodology or resourcing • To consider progress of the Project Company's Work • For changes in access to the Project Site and Temporary Areas • To consider changes directed by the ER and Hunter Water Corporation's Representative.

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 Belmont Desalination Plant (the Project).

This CNVMP has been prepared to address the requirements of the Conditions of Approval (CoA) and the measures listed in the Environmental Assessment Documentation.

1.2. Background

1.2.1. The Project

The Project was approved as SSI-8896 by the then New South Wales (NSW) Minister for Planning on the 23 July 2021. The approved Project involves the construction and operation of a drought response desalination plant producing up to 30 megalitres per day (ML/d) including seawater intake infrastructure; desalination units; brine discharge via existing ocean outfall; electricity/water supply; and ancillary works.

The approved Project is being developed on land (Part Lot 1 DP 433549) at 12a Ocean Park Road, Belmont South ('the Project area') that comprises a portion of the existing Belmont Wastewater Treatment Works (WWTW) which is located to the south east of the town of Belmont, NSW within the Lake Macquarie City Council (LMCC) local government area (LGA). Belmont Lagoon, Cold Tea Creek and the residential area of Belmont is located to the west, with the Pacific Ocean bordering the site to the east and south.

The EIS and subsequent approval documents identified the potential impacts from noise and vibration during construction is typically associated with increased traffic, increased noise impacts during certain construction stages, Out of Hours Work (OOHW), and the addition of helicopter traffic. However, it concluded residual risks from construction activities can be reduced to the extent that potential impacts could be managed through mitigation measures. A detailed Project description is provided in the CEMP.

1.2.2. Statutory Context

The Project was approved as State Significant Infrastructure (SSI-8896) by the then New South Wales (NSW) Minister for Planning and Public Spaces under Division 5.2 of Part 5 of the EP&A Act on the 23 July 2021 following submission of an EIS and Amendment Report to Department of Planning, Health and Infrastructure (DPHI) in November 2019 and August 2020 respectively. The Project is identified as an SSI project as it satisfies Clause 4(1) of the then State Environmental Planning Policy (State and Regional Development) 2011 (SEPP SRD).

Under Section 5.25 of the EP&A Act, a proponent may request the Minister to modify the approval for State Significant Infrastructure. Such approval is required if the infrastructure as modified is not consistent with the existing approval issued under section 5.13 of the Act. After consultation with the DPHI, a Modification Report was prepared to support a request by Hunter Water for the Minister to modify the approval to allow further changes to the approved project.

The Modification EIS was exhibited by the DPHI from 24 January 2024 to 20 February 2024. During the exhibition of the Modification EIS, 22 submissions were received from government agencies, stakeholders, and the community. A Submissions Report was prepared in May 2024 and made available via the Planning website.

1.3. Scope of the Plan

The scope of this Plan is to describe how the potential noise and vibration impacts will be managed during construction of the Project. This Plan and Monitoring Program have been prepared under and consistent with the CEMP, considering relevant sensitive land uses and construction activities.

This Plan is applicable to all activities during construction of the Project, including all areas where physical works will occur or areas that may otherwise be impacted by the construction works, and under the control of John

Holland (JH). All JH staff and sub-contractors are required to comply with the requirements of this Plan and related construction environmental management plans, over the full duration of the construction program. A copy of this Plan will be kept on the premises for the duration of construction.

Operational noise and vibration impacts and operation measures do not fall within the scope of this Plan and are therefore not included. Operational mitigation measures relating to noise and vibration management will be included in a separate operational noise and vibration plan as required under the CoA.

1.4. Environmental Management Systems Overview

The Environmental Management System (EMS) overview is described in the CEMP. The EMS also incorporates the Project-specific CEMP and sub-plans, strategies and procedures. The EMS provides overarching environmental management actions for implementation by Project personnel and contractors and will apply for the duration of construction.

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

- **CEMP.** Details the processes and procedures to be implemented during the Project to comply with applicable CoA, REMMs, Environment Protection Licence (EPL), legislative obligations and contractual requirements.
- **Environmental Management Sub-plans.** These documents describe procedures and controls for specific environmental aspects requiring more rigorous management strategies.
- **Monitoring Programs.** Details the monitoring regime to be implemented during construction to compare the actual performance of construction against the objectives outlined in the relevant Plan, including setting specific triggers and associated responses.
- **WHS Management Plan.** Details the processes and procedures to be implemented during the Project to comply with applicable work health and safety requirements.
- **Out of Hours Works (OOHW) Protocol.** Outlines a process for the consideration, management and approval of works which are outside the standard construction hours.
- **Helicopter Transportation Plan.** Outlines the processes associated with the use of helicopters for transportation of personnel to the Jack Up barge from the Lake Macquarie airport.
- **Noise and Vibration Impact Statements.** Site specific assessments which utilise information to predict noise and vibration impacts of construction activities used to determine suitable mitigation measures.
- **Procedures, strategies and protocols.** Detailed procedures for inclusion in work packs.

1.4.1. CNVMP preparation, endorsement and approval

The CNVMP has been prepared to satisfy the NSW CoA in relation to noise and vibration management during construction of the Project, particularly NSW CoA C11(i), C19, C29, D3, D4, D7, D12 and D14 – D17.

This CNVMP and Construction Noise and Vibration Monitoring Program has been prepared by Mattia Tabacchi, a specialist noise and vibration consultant from Renzo Tonin and Associates in accordance with CoA C19(a). These documents will be reviewed by the Hunter Water Corporation (HWC) Environmental representative (or delegate) and the independent Environmental Representative (ER) to confirm they are consistent with, and incorporate, all relevant elements of the CEMP, prior to submission to the Planning Secretary for approval.

Construction of the Project will not commence until the CNVMP, and the Construction Noise and Vibration Monitoring Program are endorsed by the ER and approved by the Planning Secretary.

1.4.2. Relationship between this Plan and other Project documents

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

- Community Consultation Strategy which details procedures and processes for community notification, consultation and complaints management. It also outlines communication processes for adjacent developments to facilitate communication of cumulative impacts.
- Incident Response Plan is a Sub-plan to the Safety Management Plan which outlines the emergency incident response process.
- Noise monitoring programs. Details the monitoring regime to be implemented during construction to compare the actual performance of construction against the objectives, including setting specific triggers and associated responses.
- Out of Hours Works (OOHW) Protocol. Outlines a process for the consideration, management and approval of works which are outside the standard construction hours.
- Helicopter Transportation Plan. Outlines the processes associated with the use of helicopters for transportation of personnel to the Jack Up barge from the Lake Macquarie airport.
- Sustainability Management Plan which sets out a framework covering energy management, workforce travel, resource use and procurement.

The CEMP provides a full list of plans, procedures and other documents that form the EMS.

1.5. Consultation for Preparation

Ongoing consultation with relevant stakeholders, including any unique local receivers (e.g. relevant councils, local businesses, and residents), may be undertaken for specific issues pertaining to the Project's response to noise impacts. Community feedback and complaints relating to noise and vibration will be dealt with in accordance with the Community Communication Strategy and the Complaints Management System (see Section 7.5 of this Plan).

In accordance with A43(d), this Plan was endorsed by the Environmental Representative (ER) on 8 October 2024 prior to submission to the Planning Secretary for approval prior to the commencement of construction in accordance with CoA C12.

2. Purpose and Objectives

2.1. Purpose

The purpose of this CNVMP is to describe how potential noise and vibration impacts will be managed 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, revised environmental mitigation measures (REMMs) and licence/permit requirements relevant to noise and vibration are described, scheduled and assigned responsibility as outlined in:

- Environmental Assessment Documentation
- Infrastructure Approval CoA (SSI 8896)
- All relevant legislation and other requirements described in Section 3.1 of this Plan.

JH will aim to meet the environmental control measures relating to noise and vibration from the Environmental Assessment Documentation. Relevant environmental control measures are detailed in Section 7.

The CNVMP has been prepared with regard to the Environmental Management Plan Guideline: Guideline for Infrastructure Projects (DPHI April 2020). Further guidelines and standards used in the preparation of this plan are detailed in Table 3-1.

3. Environmental Requirements

3.1. Relevant Legislation and Guidelines

Table 3-1 lists the principal legislation, regulation, plans, policies, guidelines, specifications, and Australian Standards that apply to noise and vibration management.

Table 3-1: Principal legislation and regulation relevant to noise and vibration

Legislation	• <i>Environmental Planning and Assessment Act 1979</i> • <i>Protection of the Environment Operations Act 1997 (POEO Act)</i> • <i>Protection of the Environment Operations (Noise Control) Regulation 2008.</i>
Standards	• British Standard BS6472-2008, Evaluation of human exposure to vibration in buildings (1-80Hz) • British Standard BS 7385: Part 2-1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground-borne vibration (BSI 1993) • German Standard DIN 4150-3 (2016) Vibration in buildings – Part 3: Effects on structures (DIN2016) • Australian Standard AS2436:2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites • Australian Standard AS/NZS 2107:2016 Acoustics - Recommended design sound levels and reverberation times for building interiors • Australian Standard AS/NZS ISO 3100:2009 Risk Management – Principals and Guidelines
Guidelines and Specifications	• Interim Construction Noise Guideline (ICNG) (DECC 2009a) • NSW EPA Assessing Vibration – a Technical Guideline (AVTG, 2006 – for human exposure) • NSW Road Noise Policy (RNP) (DECCW 2011) • Noise Policy for Industry (NSW EPA 2017). • NSW EPA Approved methods for measurements and analysis of environmental noise (NSW EPA 2022) • Environmental Management Plan Guideline: Guideline for Infrastructure Projects (DPHI April 2020)

Relevant provisions of the above legislation are explained in the Register of Legal and Other Requirements included in Appendix A of the CEMP.

3.2. Conditions of Approval – SSI-8896

The CoA relevant to this Plan are listed Table 3-2. A cross reference is also included to indicate where the condition is addressed in this Plan or other Project management documents.

Table 3-2: Condition of Approval relevant to the NVMP

CoA	Condition Requirements	Document Reference
A8	Where conditions of this approval require consultation with an identified party, the Proponent must: - consult with the relevant party prior to submitting the subject document to the Planning Secretary for approval; and - provide details of the consultation undertaken including: - the outcome of that consultation, matters resolved and unresolved; and - details of any disagreement remaining between the party consulted and the Proponent and how the Proponent has addressed the matters not resolved.	Section 7.3.3 Section 7.3.5 Section 7.4 Appendix B
A22	Any condition of this approval that requires the carrying out of monitoring or an environmental audit, whether directly or by way of a plan, strategy or program, is taken to be a condition requiring monitoring or an environmental audit under Division 9.4 of Part 9 of the EP&A Act. This includes conditions in respect of incident notification, reporting and response, non-compliance notification, Site audit report and independent auditing. <i>Note: For the purposes of this condition, as set out in the EP&A Act, "monitoring" is monitoring of the development to provide data on compliance with the approval or on the environmental impact of the development, and an "environmental audit" is a periodic or particular documented evaluation of the development to provide information on compliance with the approval or the environmental management or impact of the development.</i>	Section 0
A23	At least 48 hours before the commencement of construction until the completion of all works under this approval, or such other time as agreed by the Planning Secretary, the Proponent must: - make the following information and documents (as they are obtained or approved) publicly available on its website: - the documents referred to in condition A2 of this approval; - all current statutory approvals for the development; - all approved strategies, plans and programs required under the conditions of this approval; - regular reporting on the environmental performance of the development in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval; - a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this approval, or any approved plans and programs; - a summary of the current stage and progress of the development; - contact details to enquire about the development or to make a complaint; - a complaints register, updated monthly; - audit reports prepared as part of any independent audit of the development and the Proponent's response to the recommendations in any audit report; - any other matter required by the Planning Secretary; and - keep such information up to date, to the satisfaction of the Planning Secretary and publicly available for 12 months after the commencement of operations.	Section 8.5
B2	No later than one month before the commencement of construction, a Community Communication Strategy must be prepared and submitted to the Planning Secretary for approval. The Community Communication Strategy is to provide mechanisms to facilitate communication between the Proponent, the Council and the community (including adjoining affected landowners and businesses, and others directly impacted by the development), during the design and construction of the development. The Community Communication Strategy must: detail the mechanisms for regularly consulting with the local community throughout the development, such as holding regular meetings to inform the community of the progress of the development and report on environmental monitoring results;	Section 7.4

CoA	Condition Requirements	Document Reference
	c) detail a procedure for consulting with nearby sensitive receivers to schedule high noise generating works, vibration intensive activities or manage traffic disruptions; (e) include a complaints procedure for recording, responding to and managing complaints, including: (i) email, toll-free telephone number and postal addresses for receiving complaints; (ii) advertising the contact details for complaints before and during operation, via the local newspaper and through on-site signage; (iii) a complaints register to record the date, time and nature of the complaint, details of the complainant and any actions taken to address the complaint; and (iv) procedures for the resolution of any disputes that may arise during the course of the development; f) detail the measures for advising the community in advance of upcoming construction including upcoming out-of-hours work as required by Condition C29 and blasting activities including: xi. justification and description of the potential work, location and duration of the out-of-hours work; xii. the noise characteristics and likely noise levels of the construction / activity(ies) being undertaken; xiii. mitigation and management measures which aim to achieve the relevant NMLs and vibration criteria under Conditions D13 and D16 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers); and xiv. respite periods.	
B4	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 SSI.	Section 7.5
B6	A Complaints Register must be maintained recording information on all complaints received about the SSI during the carrying out of any work and for a minimum of 12 months following the completion of construction. The Complaints Register must record the:	Section 7.5
	a) number of complaints received; b) number of people in the household affected in relation to a complaint; c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect; and d) means by which the complaint was addressed and whether resolution was reached, with or without mediation.	
C10	Management plans required under this approval must be prepared having regard to the relevant guidelines, including but not limited to the Environmental Management Plan Guideline: Guideline for Infrastructure Projects (DPIE April 2020). Note: • <i>The Environmental Management Plan Guideline is available on the Planning Portal at: https://www.planningportal.nsw.gov.au/major-projects/assessment/post-approval</i> • <i>The Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.</i>	Section 2.2 Section 3.1
C11	Prior to the commencement of construction, the Proponent must submit a Construction Environmental Management Plan (CEMP) to the to the Planning Secretary for approval. The CEMP must include, but not be limited to, the following: i) Construction Noise and Vibration Management Sub-Plan (see condition C19);	CEMP
C18	The Construction Traffic and Pedestrian Management Sub-Plan (CTPMSP) must be prepared to achieve the objective of ensuring safety and efficiency of the road network and address, but not be limited to, the following: e) A Driver Code of Conduct must be prepared and communicated by the Proponent to heavy vehicle drivers and must address the following:	CTPMSP

CoA	Condition Requirements	Document Reference
	(iii) Minimise road traffic noise	
C19	The Construction Noise and Vibration Management Sub-Plan must address, but not be limited to, the following:	This Plan
	a) be prepared by a suitably qualified and experienced noise expert;	Section 1.4.1
	b) describe procedures for achieving the noise management levels in EPA's Interim Construction Noise Guideline (DECC, 2009);	Section 7
	c) describe the measures to be implemented to manage high noise generating works such as piling, in close proximity to sensitive receivers;	Section 7
	d) describe peak migration months for marine species that have the potential to be impacted by noise generating works and how works will be timed to avoid these periods;	Section 6.4.1
	e) include detail of sound deterrent devices that would be used to provide opportunities for marine fauna to relocate prior to works commencing;	Section Environment Control Measures7
	f) detail how interactions with cetaceans and sharks will comply with EPBC Regulations and Australian Guidelines;	Section 7.6
	g) include strategies that have been developed with the community for managing high noise generating works;	CCS Section 7.4
	h) describe the community consultation undertaken to develop the strategies in condition C19(g);	CCS Section 7.4
	i) include a complaints management system that would be implemented for the duration of the construction; and	CEMP (Section 4.8.4)
	j) include a program to monitor and report on the impacts and environmental performance of the development and the effectiveness of the implemented management measures in accordance with the requirements of condition C11.	Appendix A
C24	Prior to installation of mechanical plant and equipment: a) a detailed assessment of mechanical plant and equipment with compliance with the relevant project noise trigger levels in accordance with the Noise Policy for Industry (EPA, 2017) must be undertaken by a suitably qualified person; and b) evidence must be submitted to the Planning Secretary that any noise mitigation recommendations identified in the assessment carried out under (a) above have been incorporated into the design to ensure the development will not exceed the relevant project noise trigger levels in accordance with the Noise Policy for Industry (EPA, 2017).	Section 7.1
C29	Out-Of-Hours Work Protocol – Works Not Subject to an EPL Prior to the commencement of construction an Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of construction which is outside the hours defined in Condition D3. The Protocol must be prepared in consultation with the ER, and must provide: a) justification for why these Construction activities need to be undertaken; b) identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where: i. the ER review all proposed out-of-hours activities and confirm their risk levels, ii. low risk activities can be approved by the ER, and iii. high risk activities that are approved by the Planning Secretary. The risk assessment(s) must be based on a risk assessment carried out in accordance with AS/NZS ISO 31000:2018 "Risk Management"; c) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria; d) a process for selecting and implementing mitigation measures for residual impacts in consultation with impacted sensitive receivers at each affected location. The measures must take into account the predicted noise levels (based off worst case work scenarios and where mitigation measures will be	Section 7.3 Appendix B

CoA	Condition Requirements	Document Reference
	implemented) and the likely frequency and duration of the out-of-hours works that sensitive receivers would be exposed to, including the number of noise awakening events; e) details of respite periods consistent with the requirements developed in consultation with impacted sensitive receivers; f) 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 g) notification arrangements in accordance with Condition B2(f) and notification to the Planning Secretary of approved low risk out-of-hours works. The Protocol must be submitted to and approved by the Planning Secretary before the commencement of out-of-hours work. The approved Protocol must be implemented for the duration of Construction. The Planning Secretary may revoke the Out-of-Hours Work approval subject to ongoing community complaints. The Protocol does not apply if the requirements of Condition D4(a) or (b) or (d) are met, or if the Construction activity(ies) is subject to an EPL or if a negotiated agreement is made with the impacted sensitive receivers. Notes: <i>If Construction is regulated by the EPA via an EPL, the management of the activity or Construction must not be co-regulated under the Protocol. The Protocol process must only be used if the Construction activity is not covered by an EPL, including in circumstances where the activity or Construction did not commence under an EPL.</i> <i>If the Construction activity(ies) is subject to an EPL and the EPA does not endorse extended hours as part of the EPL, the extended hours cannot be considered under this Protocol.</i> <i>Any Planning Secretary approval for Out-of-Hours Work may be subject to trial requirements.</i> <i>The intent of the protocol is to provide an assessment framework for short term intermittent activities undertaken out of hours. These activities should be consistent with those identified in the documents listed in Condition A2. Any long term out-of-hours-work not assessed in the documents listed in Condition A2 may need a future Modification approval. The use of the terms short / long term should be considered on a case-by-case basis and be relative to the duration of construction of the SSI.</i>	
D1	A site Notice: d) The approved hours of work, the name of the site/ project manager, the responsible managing company (if any), its address and 24-hour contact phone number for any inquiries, including construction/ noise	Section 7.1
D3	Construction, including the delivery of materials to and from the site, may only be carried out between the following hours: (a) between 7am and 6pm, Mondays to Fridays inclusive; and (b) between 8am and 1pm, Saturdays. No work may be carried out on Sundays or public holidays.	Section 5.1 Appendix B
D4	Notwithstanding Conditions D3 and D7 Construction may be undertaken outside the hours specified in the following circumstances (a, b, c or d below): a) 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. On becoming aware of the need for emergency work in accordance with Condition D4 (a)(ii), the ER, the Planning Secretary and the EPA must be notified of the reasons for such work. Best endeavours must be used to notify all noise and/or vibration affected residents and owners/occupiers of properties identified sensitive receivers of the likely impact and duration of those Construction activity(ies).	Section 5.1.1 Appendix B

CoA	Condition Requirements	Document Reference
	If an activity is scheduled to take a long period to be completed, this activity should be commenced as early as possible and aim to be started and completed within the Construction hours identified in Condition D3. Poor programming should not form part of the rational to undertake safety and emergencies under Condition D4(a)(ii). It is essential to prioritise timely completion of activities to ensure the safety and well-being of workers and anyone else who may be affected by the construction activities. b) Construction that meets the following criteria, including: i. Construction that causes LAeq(15 minute) noise levels: - o no more than 5 dB(A) above the rating background level at any residence in accordance with the Interim Construction Noise Guideline (DECC, 2009), and - o no more than the 'Noise affected' NMLs specified in Table 3 of the Interim Construction Noise Guideline (DECC, 2009) at other sensitive receivers; and ii. Construction that causes LAFmax noise levels no greater than 15 dB(A) above the night period rating background level at any residence during the night period as defined in the Interim Construction Noise Guideline (DECC, 2009); and iii. Construction that causes: - o continuous or impulsive vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), and - o intermittent vibration values measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006). c) By Approval, including: i. where different hours are permitted or required under an EPL in force in respect of the SSI; or ii. Construction which is not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by Condition C29; or iii. negotiated agreement with the substantial majority of affected residents and sensitive receivers for Construction which is not subject to an EPL. Note: Refer to Appendix 4 of this approval for guidance regarding negotiated agreements. d) By Activity, including: i. MicroTBM activities at site can occur 24 hours a day, seven days a week. This does not permit material deliveries associated with MicroTBM activities. ii. Helicopter movements in accordance with Condition D41 and D42. iii. Offshore works at the jack-up barge from 5:00am to 8:00pm. Note: Although certain activities identified in Condition D4(d) are permitted to occur outside the construction hours defined in Condition D3, these activities still need to be managed in accordance within the environmental management framework established within this approval.	
D7	Except as permitted by an EPL, highly noise intensive works that result in an exceedance of the noise affected NML at the same receiver must only be undertaken: a) between the hours of 8:00 am to 6:00 pm Monday to Friday; b) between the hours of 8:00 am to 1:00 pm Saturday; and c) if continuously (any period during which there is less than one hour between ceasing and recommencing any highly noise intensive work), then not exceeding three (3) hours), with a minimum cessation of highly noise intensive work of not less than one hour.	Section 5.1 Appendix B

CoA	Condition Requirements	Document Reference
	Notes: 1. <i>As a guide, Work should be carried out in continuous blocks that do not exceed three hours each with a minimum respite period of one hour between each block.</i> 2. <i>Noise affected NML is defined as RBL + 10 dB as defined in the ICNG.</i>	
D12	The development must be constructed to achieve the construction noise management levels detailed in the Interim Construction Noise Guideline (DECC, 2009). All feasible and reasonable noise mitigation measures must be implemented and any activities that could exceed the construction noise management levels must be identified and managed in accordance with the management and mitigation measures identified in the approved Construction Noise and Vibration Management Plan.	Section 7.1 - Table 7-1 Section 7.7 Section 7.8
D14	The Proponent must implement, where practicable and without compromising the safety of construction staff or members of the public, the use of 'quackers' to ensure noise impacts on surrounding noise sensitive receivers are minimised.	Section 7.1
D15	Vibration caused by construction at any residence or structure outside the site must be limited to: (a) for structural damage, the latest version of DIN 4150-3 (1992-02) Structural vibration - Effects of vibration on structures (German Institute for Standardisation, 1999); and (b) for human exposure, the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: a technical guideline (DEC 2006) (as may be updated or replaced from time to time).	Section 7.2
D16	Vibratory compactors must not be used closer than 30 metres from residential buildings unless vibration monitoring confirms compliance with the vibration criteria specified in condition D15.	Section 7.2
D17	The limits in conditions D15 and D16 apply unless otherwise outlined in a Construction Noise and Vibration Management Plan, approved as part of the CEMP required by condition C19 of this approval	Section 7.2
D41	Helicopter operations associated with the project (inclusive of ground engine runs, starting and taxiing and flight) can only occur from 6am to 7pm, seven days per week. <i>Note: This Condition does not prohibit any flights required for emergency purposes.</i>	HTP
D42	The helicopter operator and Project must record the times and durations of all aircraft operations associated with the project and make them available for inspection when requested by the Planning Secretary.	HTP
E5	Prior to the commencement of operation, the Proponent must submit evidence to the Certifier that the noise mitigation recommendations in the assessment undertaken under condition C24 have been incorporated into the design of mechanical plant and equipment to ensure the development will not exceed the recommended operational noise levels as specified within the Noise Policy for Industry (2017).	Section 7.1

3.3. Revised Environmental Management Measures

Relevant REMMs are listed in Table 3-3. This includes reference to required outcomes, the timing of when the commitment applies and cross reference to indicate where the requirement is addressed in this Plan or other Project management documents.

Table 3-3: Revised Environmental Management Measures relevant to this CNVMP

Ref #	Impact	Measure	Timing	CNVMP Reference
NV1	Noise and vibration – Site inductions	All employees, contractors and subcontractors will receive an environmental induction. The induction will include: • All relevant Project specific and standard noise and vibration mitigation measures • Relevant licence and approval conditions • Permissible hours of work • Location of nearest sensitive receivers • Employee parking areas • Designated loading/unloading areas and procedures. • Site opening/closing times (including deliveries) • Environmental incident procedures.	Pre-construction, Construction	Section 7.1 Section 7.7 Section 8.2
NV2	Noise and vibration - Behavioural practices	• No swearing or unnecessary shouting or loud stereos/radios on site. • No dropping of materials from height, throwing of metal items and slamming of doors.	Pre-construction, Construction	Section 7.1 Section 7.7
NV3	Equipment selection	Use quieter and less vibration emitting construction methods where reasonable and feasible.	Pre-construction, Construction	Section 7.1 Section 7.7
NV4	Noise and vibration - community consultation	Ongoing stakeholder consultation will occur including: • Establishing contact with local residents and the construction program and progress communicated on a regular basis, particularly when noisy activities are planned • Notifying affected receivers of the intended work, its duration and times of occurrence. This may include a local community update letters for specific construction activities and a Project info line • Specific notifications will be provided to receivers where the highly noise affected level of 75 dB(A) is predicted to be exceeded.	Pre-construction, Construction	Section 7.1 Section 7.7
NV5	Use and siting of plant	• Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be avoided. The offset distance between noisy plant and adjacent sensitive receivers is to be maximised • Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers.	Construction	Section 7.1 Section 7.7
NV6	Noise and vibration - Traffic Noise	• Comply with the recommended standard construction hours • Plan traffic flow, parking and loading unloading areas to minimise reversing movements within the site • Loading and unloading of materials/deliveries is to occur during standard construction hours	Construction where reasonable and feasible	Section 7.1 Section 7.7

Ref #	Impact	Measure	Timing	CNVMP Reference
		- Contractors are to avoid dropping materials from height where practicable, during loading and unloading - Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible - Heavy vehicles will be scheduled to arrive on site during standard construction hours i.e. 7AM and 6PM, where practicable and any necessary out of hours heavy vehicle movements will be managed through the Out of Hours Protocol to be provided in the Project's Conditions of Approval		
NV7	Noise and vibration - vibration monitoring	- Vibration monitoring will be undertaken where equipment is being used within the safe working distances detailed in Table 7-41 of the EIS or when a complaint is received. Vibration monitoring will be conducted during these activities at the most susceptible buildings close to the construction sites. - Any vibration measurement will be undertaken by a qualified professional and with consideration to the ICNG guidelines.	Construction	Section 7.1 Section 7.7 Section 8.3 Appendix A
NV8	Noise and vibration - complaints management	Complaints will be managed in accordance with the CEMP and the procedure outlined below. Signage will clearly and visibly provide a contact number and name to receive complaints and enquiries about construction. Potential complaints specific to these works could include: - Vibration impacts from works that significantly affect structures or dwellings - A cluster of noise and/or vibration complaints - Works have the potential to cause noise complaints from nearby receivers. The response will be to: - Verbally respond to complainant - Provide a written response within seven calendar days if the complaint cannot be resolved verbally - Log the complaint, and any actions taken with regards to the complaint within a complaints register - Undertake monitoring at the complainant's residence(s) - Investigate the nature and reasons of the impact - Investigate and implement further mitigation measures to minimise the impact.	Construction	Section 7.1 Section 7.5 Section 7.7
NV9	Noise and vibration - high noise intensive works	Hours for highly noise intensive works will be undertaken in accordance with the EPA's requirements detailed in Section 2.4.8.5 of the EIS.	Construction	Section 7.1
NV10	Noise and vibration - conditions of approval	Hunter Water will commit to undertaking the required Noise and Vibration specifications in the conditions of approval.	Design	Section 7.1

Ref #	Impact	Measure	Timing	CNVMP Reference
NV11	Noise – Respite periods	High noise generating activities may only be carried out in continuous blocks, not exceeding three hours each, with a minimum respite period of one hour between each block. High noise refers to construction noise impacts which exceed the highly affected noise management level of 75 dB(A) LAeq(15- min) at the nearest sensitive receiver during standard construction hours.	Construction	Section 7.1
NV12	Sleep disturbance – annoying characteristics	Any annoying characteristics (such as tonality, low frequency, impulsiveness, etc.) generated by the site will need to have corrections factors applied, as per the NPI. This will need to be assessed as part of the detailed design stage where specific operational equipment are selected.	Detailed design	Section 7.1
NV13	Operational noise – Detailed Design	The following design strategies will be incorporated into the detailed design of the desalination plant: • Selection of equipment and plant items to limit noise emissions. Where practical and feasible, motor drives, gear boxes, pumps, etc. will be specified and selected to achieve a noise level of less than 85 dB(A) at a distance of one metre, consistent with occupational health and safety requirements • Purpose built acoustic enclosures to be provided where required for large plant items in order to achieve noise levels of less than 85 dB(A) at one metre.	Detailed design	Section 7.1
NV14	Construction noise	The contactor should manage the total noise from construction of the project especially when undertaking noisy activities to minimise the risk that the combined noise will lead to higher than predicted noise at nearby receivers.	Construction	Section 7.1
NV15	Construction traffic	The following measures will be implemented to manage construction traffic noise: • Schedule construction traffic movements, especially heavy vehicles, to minimise night periods • Reduce the speed of construction related Heavy Vehicle traffic to 40 km/hour along Beach Street and Ocean Park Road and to 20 km/hr within the Project area • Organise consultations and messaging (letterbox drops, phone calls, etc) to alert and inform residents along the affected construction traffic routes. Consultation should include, as a minimum, the predicted noise levels along the construction traffic Heavy Vehicle routes and the timings of traffic movements.	Construction	Section 7.1
NV16	Helicopter noise	The following measures will be implemented to manage construction helicopter noise: • Schedule helicopter movements so that they occur within 6:00AM and 7:00 PM and avoid night periods to the greatest extent possible, unless required for emergencies • Operate all helicopters associated with the Proposed Modification in line with the noise management requirements of the Lake Macquarie Airport General Conditions of Use and the general 'Fly Neighbourly' Principles.	Construction	Section 7.1

Ref #	Impact	Measure	Timing	CNVMP Reference
NV17	Vibration impacts from construction traffic	Prior to commencing construction and after completion of construction, a condition assessment will be offered to houses along Beach Street, Belmont South. A written and photographic report will be prepared to document the condition of buildings and structures. A copy of the report will be provided to the relevant land owner or land manager.	Pre-Construction, Construction, Post-Construction	Section 7.1

4. Existing Environment

This section summarises the existing noise and vibration conditions within and adjacent to the Project, based on information contained in the Environmental Assessment Documentation. The information provided below comprises the baseline data used for the Construction Noise and Vibration Monitoring Program (Appendix A).

The noise environment within the suburban area is generally influenced by road traffic from the Pacific Highway particularly during the day-time period. Natural white noise from Tasman Sea and Belmont Bay are also audible during quieter periods when traffic volumes drop. During the evening and night-time periods, ambient noise levels typically decrease due to a reduction in the volume of road traffic.

The existing Belmont Waste Water Treatment Works (WWTW) is located at the northern extent of the project area, suburban residential receivers including active and passive recreational areas, motels and educational facilities are generally located to the west of the Project area. The suburban residential areas in Belmont are located to the north west of the Project.

4.1. Sensitive Receivers

There are sensitive receivers surrounding the Project area (i.e. within 1km), which may be impacted by noise from the construction works and operation of the proposed plant. The nearby sensitive receivers identified, are categorised as:

- Residential
- Commercial/Retail
- Active recreation (Belmont Golf Club, Nine Mile Beach, Belmont South Playground)
- Passive recreation (Belmont Cemetery)
- Education (Creative Kids Preschool)

Sensitive receiver locations and figures showing their location can be found in Appendix A. Sensitive receivers will be reviewed during each revision of this Plan to determine whether any additional measures are required to minimise potential noise and vibration impacts.

4.2. Existing Noise Environment (baseline data and ambient noise)

The ambient noise environment is dominated by a combination of road traffic noise in the vicinity of the Pacific Highway at Belmont, local transport activities and natural white noise from Tasman Sea and Belmont Bay.

Baseline unattended noise monitoring was conducted in accordance with the procedures in the Noise Policy for Industry (NPI, 2017) guideline at one location. The noise logger was deployed at 24 Beach Street, South Belmont. This location was selected to capture noise characteristics considered representative of the project. Selection considerations included location of sensitive receivers, land topography and contribution from other noise activities, such as road noise. An attended noise measurement was also conducted for a 15-minute duration to identify ambient noise sources and validate unattended logger data. The locations in which the noise monitoring surveys were carried out are shown on Figure 4-1.

Unattended monitoring was carried out between 23 September 2019 and 30 September 2019 at 1 location (LO1). The derived Rating Background Levels (RBL) were re-established in the Modification Report from the levels presented in the EIS. The RBLs are presented in Table 4-1 and have been utilised to determine the Noise Management Levels (NML) applicable to the site component of the completed Construction Noise Assessment.

Table 4-1: Ambient noise monitoring results and derived RBL

ID	Address	RBL, dB (A) ¹			Ambient Noise dB (A)		
		Day	Evening	Night	Day	Evening	Night
L01	24 Beach Street, Belmont	38	37	33	55	50	47

Notes: Day time: 7:00AM to 6:00PM Monday to Saturday; or 8:00AM to 6:00PM on Sundays and Public Holidays. Evening: 6:00PM to 10:00PM. Night time: remaining period (NSW Noise Policy for Industry (EPA, 2017)).

4.3. Marine Environment

Noise generating activities will be undertaken within the marine environment (i.e. use of marine vessels, Jack Up Barge operations, Use of helicopters), this section describes the existing marine environment and identifies aspects that may be affected by noise from the Project.

4.3.1. Benthic Ecology

A variety of filter feeding organisms have recruited to the Belmont WWTW outfall pipe, such that there is now a locally dense and diverse community established that supports an array of invertebrate and fish species. The assemblages are typically dominated by marine worms and small crustaceans.

4.3.2. Fish Assemblages

Fish assemblages associated with the pipeline include those that are using the structure refuge, those that are actively feeding on the sessile organisms, and higher order predators which are attracted to this prey. Typical species observed include the highly abundant Mado which are ubiquitous across the pipe as well as Australian Salmon.

4.3.3. Conservation Values

Marine biologically important areas for some of the region's protected species (DoEE, 2015) cover the Project locality, comprising humpback whale migration, shearwater bird foraging, Indo-Pacific/Spotted Bottlenose dolphin breeding and calving and grey nurse shark breeding. Further, the Project is located within a broad area that is designated by the Department of Primary Industries as key fish habitat.

A number of threatened species were identified by the BC and FM BioNet as species having the potential to occur within the project area. Of these species the following were identified as potentially occurring in the project area and assessed under the BC Act 2016 assessment criteria: New Zealand fur seal (*Arctocephalus forsteri*) (vulnerable), Southern right whale (*Eubalaena australis*) (endangered 1), dugong (*Dugong Dugon*) (endangered 1), humpback whale (*Megaptera novaeangliae*) (vulnerable), and loggerhead (*Caretta caretta*) (endangered 1) and green turtles (*Chelonia mydas*) (vulnerable).

Schedule 4, 4A and 5 of the FM Act 1994 provides lists of critically endangered, endangered and vulnerable species, populations and ecological communities occurring in NSW. The great white shark (*Carcharodon carcharias*) was identified as potentially occurring in the project area and was thus assessed under the FM Act 1994 assessment criteria as Hawks Nest and Stockton Beach are a known primary residency region for juveniles of the species.

The EPBC Act 1999 Protected Matters Search Tool was used to identify MNES, and other matters protected under the EPBC Act 1999 that are predicted to occur in or relate to the project area. This search identified a number of MNES of relevance to the project and likely to occur within the project area; these have been assessed in accordance with the related Significant Impact Guidelines 1.1 (Commonwealth of Australia, 2013): great white shark, loggerhead, green and hawksbill turtles, southern right whale and humpback whale, and dugong.



Figure 4-1: Project Locality and Noise Monitoring Locations

5. Noise and Vibration Objectives

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

- NSW Interim Construction Noise Guideline (ICNG), Department of Environment and Climate Change 2009
- Assessing Vibration – A Technical Guideline (AVTG), Department of Environment and Conservation 2006
- German Standard DIN4150-2016, Structural vibration Part 3: Effects of vibration on Structures
- British Standard 7385: Part 2-1993 'Evaluation and measurement of vibration in buildings Part 2 (BSI, 1993).

Relevant elements of these documents are summarised and discussed in this section.

5.1. Construction Work Hours

Standard working hours for the Project are defined by the CoA and are presented below in Table 5-1. Works outside standard construction hours will be undertaken in accordance with CoA Condition D4 and the OOHW Protocol (Appendix B).

Table 5-1: Approved construction work hours

CoA	Construction Activity	Working hours applicable to Condition		
		Monday to Friday	Saturday	Sunday/ Public holiday
Standard Work Hours				
D3	Construction, including the delivery of materials to and from the site, may only be carried out between the following hours:	7:00am to 6:00pm	8:00am to 1:00pm	No work
D7	Except as permitted by an EPL, highly noise intensive works that result in an exceedance of the noise affected NML at the same receiver must only be undertaken Note 1 : If continuously (any period during which there is less than one hour between ceasing and recommencing any highly noise intensive work), then not exceeding three (3) hours), with a minimum cessation of highly noise intensive work of not less than one hour. As a guide, Work should be carried out in continuous blocks that do not exceed three hours each with a minimum respite period of one hour between each block. Noise affected NML is defined as RBL + 10 dB as defined in the ICNG.	8:00am to 6:00pm	8:00am to 1:00pm	No Work
D41	Helicopter operations associated with the project (inclusive of ground engine runs, starting and taxiing and flight) Note 2: This Condition does not prohibit any flights required for emergency purposes.	6:00am to 7:00pm	6:00am to 7:00pm	6:00am to 7:00pm

5.1.1. Variation to Construction Hours

Notwithstanding CoA Conditions D3 and D7, construction may be undertaken outside the hours specified in accordance with CoA Condition D4. These circumstances are presented in Table 5-2.

Table 5-2: Variation to construction work hours, CoA Condition D4

Circumstance	Details	Applicable Actions
Safety and Emergencies	(v) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or (vi) 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	On becoming aware of the need for emergency work in accordance with Condition, D4(a)(ii) JH will notify the ER, the Planning Secretary and the EPA of the reasons for such work. Best endeavours will be used by JH to notify all noise and/or vibration affected residents and owners/occupiers of properties identified sensitive receivers of the likely impact and duration of those Construction activities. If an activity is scheduled to take a long period to be completed, JH will endeavour to undertake the activity as soon as practicable in accordance with CoA Condition D3 and prioritise timely completion of activities to ensure the safety and well-being of those who may be affected by the construction activities.
Construction that meets the specific criteria	(i) Construction that causes $L_{Aeq}(15 \text{ minute})$ noise levels: • no more than 5 dB(A) above the rating background level at any residence in accordance with the <i>Interim Construction Noise Guideline</i> (DECC, 2009), and • no more than the 'Noise affected' NMLs specified in Table 3 of the <i>Interim Construction Noise Guideline</i> (DECC, 2009) at other sensitive receivers; and (ii) Construction that causes L_{AFmax} noise levels no greater than 15 dB(A) above the night period rating background level at any residence during the night period as defined in the <i>Interim Construction Noise Guideline</i> (DECC, 2009); and (iii) Construction that causes: • continuous or impulsive vibration values, measured at the most affected residence are no more	Complete OOHW Application (refer to Appendix B)

Circumstance	Details	Applicable Actions
	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 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	(i) where different hours are permitted or required under an EPL in force in respect of the SSI; or (ii) Construction which is not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by Condition C29; or (iii) negotiated agreement with the substantial majority of affected residents and sensitive receivers for Construction which is not subject to an EPL.	Complete OOHW Application (refer to Appendix B)
By Activity	(i) MicroTBM activities at site can occur 24 hours a day, seven days a week. This does not permit material deliveries associated with MicroTBM activities. (ii) Helicopter movements in accordance with Condition D41 and D42. (iii) Offshore works at the jack-up barge from 5:00am to 8:00pm seven days per week. <i>Note: Although certain activities identified in Condition D4(d) are permitted to occur outside the construction hours defined in Condition D3, these activities still need to be managed in accordance within the environmental management framework established within this approval.</i>	Complete OOHW Application (refer to Appendix B)

5.2. Construction noise objectives

The ICNG provides guidance 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.

5.2.1. Construction Noise

The ICNG establishes NMLs for recommended standard construction hours and for hours outside of the recommended standard hours. Construction is considered to have the potential to cause a noise impact if the predicted noise exceeds the applicable NML. ICNG guidance for establishing construction NMLs at residential receivers is presented in Table 5-3. Construction activities will generally occur during standard construction hours however, some activities will be undertaken outside the standard hours in accordance with Section 5.1 and Appendix B.

Table 5-3: ICNG Guidance for Establishing Construction NMLs at Residential Receivers

Time of day	Construction NMLs ¹ LAeq(15 min)	How to apply
Recommended standard hours: • Monday to Friday 7am to 6pm • Saturday 8am to 1pm • No work on Sundays or public holidays	Noise affected. RBL + 10dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq(15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
Standard construction hours and outside of standard construction hours	Highly noise affected. 75dB(A)	Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: • Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) • If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

Time of day	Construction NMLs ¹ LAeq(15 min)	How to apply
Outside recommended standard hours	Noise affected. RBL + 5dB	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dB(A) above the noise affected level, the proponent should negotiate with the community. The process for justification, assessment, and approval for out-of-hours-work (OOHW) is detailed in the OOHW Protocol, for additional guidance on negotiating agreements see Section 7.2.2 of the ICNG.

¹ Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Residential receivers are considered 'noise affected' where construction noise levels are greater than the NMLs. The noise affected level represents the point above which there may be some community reaction to noise. If construction noise is equal to or above LAeq(15 minute) 75 dB(A) at any residence at any time, that residential receiver is considered to be highly noise affected.

Where predicted and/or measured construction noise levels exceed NMLs, feasible and reasonable noise mitigation and/or management measures will be considered in order to meet the NMLs. The Construction NMLs that apply to sensitive receivers during construction of the Project are presented in Table 5-4.

Table 5-4: Construction NMLs at identified receivers

Receiver Type	ICNG Management Level LAeq(15min) dB(A) ¹				
	Highly affected noise level	During standard construction hours	Outside standard construction hours (day ¹)	Outside standard construction hours evening ²)	Outside standard construction hours night ³)
Residential ⁴	75 dB(A)	48 dB(A)	43 dB(A)	42 dB(A)	38 dB(A)
School	-	45 dB(A) Internal (When in use)	-		
Commercial	-	70 dB(A) External	70 dB(A) External, if in use	70 dB(A) External, if in use	70 dB(A) External, if in use
Active recreation area	-	65 dB(A) External	-	-	-

Notes:

- 1 Outside standard construction hours (day) is defined as 7:00 am to 8:00 am and 1:00 pm to 6:00 pm on Saturdays, 8:00 am to 6:00 pm on Sundays and public holidays.
- 2 Outside standard construction hours (evening) is defined as 6:00 pm to 10:00 pm Monday to Sundays.
- 3 Outside standard construction hours (night) is defined as 10:00 pm to 7:00 am Monday to Friday and 10:00 pm to 8:00 am on Saturdays, Sundays and public holidays.
- 4 Criteria based on night time RBL.

5.2.2. Construction Traffic Noise

Construction traffic NMLs set at 2dB above the existing road traffic noise levels during the daytime and night-time periods are considered appropriate to identify the onset of potential noise impacts. Where the road traffic noise levels are predicted to increase by more than 2dB because of construction traffic, consideration will be given to applying feasible and reasonable noise mitigation measures to reduce the potential noise impacts and preserve acoustic amenity.

In considering feasible and reasonable mitigation measures where the relevant noise increase is greater than 2dB, consideration will also be given to the actual noise levels associated with construction traffic and whether these levels comply with the following road traffic noise criteria in the Road Noise Policy (RNP) (DECCW, 2011). Table 5-5 presents the applicable criteria relating to noise due to additional traffic generated during construction of the Project.

Table 5-5: Residential NML guideline

Road Category	Type of Receiver	Assessment criteria – dB(A)	
		Day (7AM – 10 PM)	Night (10PM – 7AM)
Freeway/arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing arterial roads generated by land use developments ¹	60 LAeq(15hr) dB(A)	LAeq, (9 hour) 55 dB (A)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	55 LAeq(1hr) dB(A)	LAeq, (1 hour) 50 dB(A)

1 Under the RNP this is any land use that causes additional traffic. Construction is considered a land use.

5.2.3. Helicopter Noise

There is no applicable NSW environmental noise assessment guidance methodology for helicopter noise. For the purpose of assessing noise from helicopter landings and take-off from the Jack-Up Barge, an indicative noise performance benchmark has been selected based on Section 165 of the NSW Environmental Noise Control Manual (NSW EPA, 1994) (ENCM). It is noted that the ENCM is now superseded/ withdrawn and there is no stipulated legislative requirement for the criteria in the ENCM to be met by the Project. The ENCM noise level guidelines have only been considered as a nominal benchmark for the project's helicopter noise to be compared against.

The relevant sections of the ENCM, which have been adopted as the noise performance benchmark for the project's helicopter noise, includes:

- The measured LAeq,T (assessed over the entire daily operating time of the helipad (assumed for this assessment to be 7AM – 10PM for day and 10PM – 7AM for night)) should not exceed 55 dB(A) for a residence or 65 dB(A) for a commercial property.
- The measured maximum noise level L_{max} should not exceed 82 dB(A) at the nearest residential premises or 85 dB(A) at the nearest commercial building.

Operation outside the hours of 7 am to 10 pm should not be permitted except for emergency flights.

5.2.4. Sleep Disturbance

Where construction works are planned to extend over more than two consecutive nights, the ICNG recommends that an assessment of sleep disturbance impacts be completed. The ICNG refers to the Environmental Criteria for Road Traffic Noise (EPA 1999) for assessing the potential impacts, which notes that to limit the level of sleep disturbance, the L_{Amax} should not exceed the existing L_{90} noise level by more than 15 dB(A). In situations where this results in an external screening level of less than 55 dB(A), a minimum screening level of 55 dB(A) is set. Note that this is equivalent to a maximum internal noise level of 45 dB(A) with windows open.

Where there are noise events found to be above the initial screening level, further analysis is required to identify whether events exceed an 'awakening reaction' level of 55 dB(A) L_{AFmax} (internal) that equates to NML of 65 dB(A) externally (assuming open windows).

5.3. Construction vibration objectives

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 structures – vibration in which the integrity of the building or structure itself may be prejudiced.

The following construction vibration standard/guidelines apply for the Project:

- For human comfort:
 - Assessing Vibration – A Technical Guideline (AVTG), Department of Environment and Conservation 2006
- For cosmetic damage:
 - German Standard DIN4150-2016, Structural vibration Part 3: Effects of vibration on Structures
 - British Standard 7385: Part 2-1993 'Evaluation and measurement of vibration in buildings Part 2 (BSI, 1993).

5.3.1. Human comfort

Vibration limits to minimise impacts on human comfort have been established with consideration to the Assessing Vibration – A Technical Guideline (DEC 2006) (AVTG). AVTG presents limits (vibration dose values), above which there is considered to be a risk that the amenity and comfort of people occupying buildings would be adversely affected by construction work.

While the AVTG recommends that for intermittent vibration VDV is used as the primary indicator for human comfort, the British Standard BS 5228-2:2009 Code of practice for noise and vibration on construction and open sites – Part 2: Vibration guidance (BS, 2009) can be used as an additional indicator of perceptibility. The applicable criteria for intermittent vibration are shown in Table 5-6.

Table 5-6: Vibration limits: Guidance for human exposure from intermittent vibration

Building type	Assessment period ¹	Vibration dose values ($m/s^{1.75}$)	
		Preferred	Maximum
Critical working areas (e.g. operating theatres or laboratories) ²	Daytime or night-time	0.10	0.20
Residential	Daytime	0.20	0.40
	Night-time	0.13	0.26

Building type	Assessment period ¹	Vibration dose values (m/s ^{1.75})	
		Preferred	Maximum
Offices, schools, educational institutions and places of worship	Daytime or night-time	0.40	0.80
Workshops	Daytime or night-time	0.80	1.60

To assess the potential for vibration impact on human comfort, an initial screening test will be done based on peak velocity units, as this metric is also used for the cosmetic building damage vibration assessment. This screening test is a conservative approach since it is based on the continuous vibration velocity criteria (i.e. vibration that continues uninterrupted for a defined assessment period) whilst construction works are mostly intermittent with the exception of Micro-TBM and pipe jacking which will be undertaken 24 hours per day, 7 days per week. The initial screening test for vibration disturbance to building occupants, based on the peak particle velocity (ppv, mm/s) are presented in Table 5-7. If the predicted vibration exceeds the initial screening test, the total estimated Vibration Dose Value (i.e. eVDV) will be determined based on the level and duration of the vibration event causing exceedance.

Table 5-7: Construction vibration disturbance to building occupants – initial screening test

Place and Time	Maximum Peak particle velocity (mm/s)
Residential buildings 16 hr day	0.56
Residential buildings 8 hr night	0.40
Offices, when in use	1.10
Workshops, when in use	2.20

5.3.2. Cosmetic Damage

Vibration criteria for cosmetic damage have been established with consideration to:

- British Standard BS 7385:1993 Evaluation and Measurement for Vibration in Buildings – Part 2: Guide to Damage Levels from Ground Borne Vibration (BS, 1993) for guidance on cosmetic damage to residential buildings.
- German Standard DIN 4150-3: 2016 Vibrations in buildings – Part 3: Effects on structures for guidance on cosmetic damage to heritage buildings

If the relevant threshold for cosmetic damage is unlikely to be exceeded, then structural damage is not considered a significant risk and is not further assessed. BS 7385:1993 (BS, 1993) provides guidance on the vibration level likely to cause cosmetic damage to residential buildings or reinforced structures. The guide is reproduced below in Table 5-8.

Table 5-8: Recommended vibration limits for cosmetic damage

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	

The Standard goes on to state that the vibration values given in Table above are less than half of vibration magnitudes at which minor damage is possible, and less than a quarter of the vibration magnitudes at which major damage to a building structure may occur.

It is noteworthy that the standard states that:

“Some data suggests that the probability of damage tends towards zero at 12.5 mm/s peak component particle velocity. This is not inconsistent with an extensive review of the case history information available in the UK.”

Also, that:

“A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive.”

The Standard states that the guide values in Table 5-8 relate predominantly to transient vibration which does not give rise to resonant responses in structures and low-rise buildings.

Where the dynamic loading caused by continuous vibration may give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in Table 5-8 may need to be reduced by up to 50%.

Some construction activities involving intermittent vibration sources such as rock breakers, vibratory rollers, excavators and the like, may have the potential to cause dynamic loading in some structures (e.g. residences). On this basis, a conservative vibration damage screening level per receiver type adopts 50% of the values in Table 5-8 as listed below:

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

5.3.3. Heritage structures

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

A conservative vibration damage screening level (peak component particle velocity) for heritage buildings/structures can be set to 3 mm/s (the more stringent criterion in the German Standard DIN 4150-2016 Structural Vibration Part 3: Effects of Vibration on Structures). This screening level will allow potentially impacted heritage structures to be identified. If a heritage structure is predicted to be exposed to vibration levels above the conservative vibration screening level of 3 mm/s, further investigation would be undertaken to determine whether the structure is structurally unsound. Where a heritage building/structure is deemed to be sensitive to vibration impacts (i.e. structurally unsound), the more stringent DIN 4150-2016 Group 3 guideline values can be applied. Otherwise, structural damage vibration limits based on BS 7385 can be applied.

At locations where the predicted and/or measured vibration levels are greater than shown above (peak component particle velocity), a more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure would be required to determine the applicable vibration objectives.

5.3.4. Other vibration sensitive structures and utilities

Vibration impacts from construction has the potential to affect services and utilities such as buried pipelines, and fibre optic cables. Specific vibration criteria would be determined on a case-by-case basis. Where these utilities are encountered, the structure or utility's owner will be consulted to determine acceptable vibration (if required). In lieu of specific criteria, the NVMP provides limits for short term vibration on these structures/utilities based on guidance in *German Standard DIN 4150 (2016) Part 3: Structural Vibration in Buildings: Effects on Structures*. These limits are reproduced in Table 5-9.

Table 5-9: Guideline values for vibration velocity for buried pipework

Pipe Material	Guideline values for velocity measured on the pipe, v_i , in mm/s
Steel (including welded pipes)	100
Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80
Masonry, plastic	50

6. Environmental Aspects and Impacts

6.1. Environmental Noise Aspects

Results of the assessment found that all stages associated with the construction of the desalination plant are not expected to exceed the NMLs. Additional construction related traffic is predicted to have a noticeable impact relative to current traffic noise.

Several inputs were used to create the model and were based on the Project area layout, plant and equipment sound power levels (SWLs) and topography and included scenarios associated with specific construction activities outlined in the EIS and Amendment Report including:

- Planning mobilisation and preparation
- Desalination plant – earthworks and hardstand
- Desalination plant – pipeline connections
- Caisson installation
- DOI installation
- Commissioning
- Tank installation
- Containerised equipment
- Compounds

Additionally, noise impacts on residential receivers have been revised from the EIS and Amendment Report, based on the assumption that the only acoustic change during the construction of the Project is associated with the SWL of the construction activities, as the locations of the works (with the exception of the relocated DOI), topography and residential receiver locations have not changed. Therefore, any changes to the SWL of each construction noise stage would have an approximately equal change to the sound pressure level (SPL) at the residential receivers. SPLs have been compared to the applicable NML to determine the construction noise impact.

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

- The type of equipment in use
- Characteristics and intrusiveness of sound
- The number of equipment simultaneously in use
- Ground condition.
- Topography and other physical barriers
- Proximity to sensitive receivers
- The physical condition of sensitive receiver structure
- Hours/duration of construction works.
- Existing background noise.

Section 7 of this Plan provides a suite of mitigation measures that will be implemented to avoid or minimise impacts on the receiving community and/or built environment.

6.1.1. Construction Traffic

Construction traffic including truck movements to and from site have been assessed as part of the Environmental Assessment Documentation.

Construction Traffic will access the site using the designated heavy vehicle route along Beach St and Ocean Park Road. Further assessment as part of the Submissions report and response to RFI found that, due to the construction traffic associated with the Project, the closest residential receivers located along the Pacific Highway, Beach Street, Hudson Street, Ocean Park Road would experience traffic noise greater than the applicable traffic noise assessment level. Although, due to significant existing traffic on the Pacific Highway, the construction traffic would not increase the overall traffic noise level on the Pacific Highway by more than 2 dB(A) and therefore, any actual change in traffic noise would be limited along this road. Mitigation measures for construction traffic is detailed in the CTPMSP.

6.1.2. Helicopter Noise

The noise impacts associated with the take-off and landing of helicopters from the jack-up barge was assessed using the CONCAWE noise propagation algorithm. Several inputs were used to create the model and were based on topography, receivers, ground absorption, noise sources, meteorological conditions, and timing of daily helicopter movements.

Helicopters will operate between Lake Macquarie Airport and the jack-up barge using designated flight paths identified in the Helicopter Transportation Plan (HTP). Noise related impacts from helicopter activities on residential receivers at Belmont and Belmont South is considered unlikely as the noise levels from the jack-up barge landing and take offs have been predicted to remain well below the respective noise performance benchmarks. To mitigate potential noise impacts from the use of helicopters, movements will be scheduled so they occur between 6:00am and 7:00pm in accordance with CoA Condition D41. Helicopter use will also be undertaken in alignment with the requirements of the Lake Macquarie Airport General Conditions of Use and the general 'Fly Neighbourly' Principles.

6.1.3. Summary of Activities

Table 6-1 provides a summary of the construction phases for the Project and description of activities anticipated to be used during this phase. This table aligns with the activities discussed within the CEMP and provides further details on noise related aspects and impacts associated with each construction phase. Activities characterised as the operational phase have not been included in this table.

Table 6-1: Construction scenarios and associated activities

Construction Phase	Typical activities	Indicative Duration	Noise Related Aspects and Impacts
Pre-construction activities	- Detailed investigations and survey work including geotechnical investigative drilling, excavations, archaeological investigations and salvage, and environmental monitoring. - Road dilapidation and building condition surveys. - Site enabling work, fencing and signage. - Installation of environmental controls including temporary or permanent fencing, erosion and sediment control mitigation measures, and habitat connectivity measures. - Construction of temporary drainage controls including temporary creek crossings. - Adjustment, relocation and protection of public utilities and services within site footprint as required.	As required - preconstruction	Before construction begins, ancillary facilities will be established to allow construction works to occur. The works will vary depending on location and the existing conditions but could include: - Minor earthworks - Installation of office facilities - Utilities - Amenities - Secure perimeter fencing, including visual screening of construction ancillary facilities where necessary. These works would be predominately undertaken during standard hours.
Establishment	- Site establishment would generally include the following activities: - Setup environmental mitigation measures, including sediment and erosion controls. - Mobilisation: Establish construction compounds including laydown and storage areas and spoil areas. Install temporary fencing around construction area and demarcate environmentally sensitive areas, establish all vehicle entry points, access roads and turning bays. It is likely that vegetation clearing for the Project area would occur at commencement of works and may be undertaken by a specialist contractor.	Within the timeframe for each aspect	Construction areas will generally comprise: - Temporary buildings (generally prefabricated) including offices and meeting rooms, amenities and first aid facilities (the size and number of office facilities at the main ancillary facilities) - Hardstand parking areas with sufficient space to accommodate the numbers of construction workers expected at any site.

Construction Phase	Typical activities	Indicative Duration	Noise Related Aspects and Impacts
			Materials laydown, storage and handling areas, including purpose built temporary structures as required. These works would be predominately undertaken during standard hours. The site layout is considered indicative and will be confirmed as the project progresses.
Power Upgrades	Connection to Ausgrid's existing 11 kV line located to the southwest of the Project area, with a new conduit or power line installed either above ground or underground along the access road to the Project	3 months	Thes majority of works would be undertaken during standard hours. Ausgrid may energise out of hours, to ensure public safety, which JH will assess via the appropriate protocols.
Direct Ocean Intake	The construction methodology for the intakes work is described in detail below, and would generally comprise the following key aspects: - Sea Water pump station: installed via a wet well technique as the sandy soils, depth and high groundwater conditions would prevent open excavation. Include piling for the works. - Intake pipeline: indicative alignment approximately 850 m in length, extending perpendicular to the beach in an Easterly (E) direction to the offshore intake structure, completed via the micro-tunnelling / pipe jacking method (micro-TBM) described below - Intake structure (offshore): in the form of an intake with a velocity cap structure and low through screen velocity to minimise impacts on marine species and habitat.	12-18 months	The DOI system onshore will generally comprise: - onshore pump station, including a central well, screening and pump housing, consisting of a concrete structure. - intake pipeline which would be constructed using a Micro-TBM ((Pipejacking/micro-tunnelling). Peak noise impact works during the establishment and installation of the DOI will be required at certain times and will include the use of (but not limited to): crane, pumping infrastructure, water separator and de-sanding equipment, delivery of pipe segments, pumping and extraction of groundwater. These works would be predominately undertaken during standard hours however, an out-of-hours-work protocol has been developed for activities that are not specifically defined as OOHW within the environmental assessment documentation (Appendix B) The DOI system offshore will generally comprise:

Construction Phase	Typical activities	Indicative Duration	Noise Related Aspects and Impacts
			Off-shore intake structure, the intake structure would be in the form of a horizontal intake with a velocity cap structure and low through-screen velocity to minimise impacts on marine species and habitat. The intake structure would be located in slightly deeper waters around 18 m in depth. Peak noise impact works during the establishment and installation of the DOI will be required at certain times and will include the use of (but not limited to): jack-up barge and associated operational components and helicopter. These works would be predominately undertaken during standard hours however, an out-of-hours-work protocol has been developed for activities that are not specifically defined as OOHW within the environmental assessment documentation (Appendix B)
Water Treatment Process Plant	- The construction methodology for the water treatment process plant would generally comprise the following key aspects: - Earthworks and construction of hardstand and associated buildings for operational equipment housing - Process pipeline connections - Installation of storage tanks, construction of various concrete structures and installation of process equipment - Stabilisation and revegetation	12-24 months	The infrastructure area will generally comprise: - Water Treatment and Process Plant – including a number of modules and equipment, some of which would be housed in on-site sheds placed above ground level and located to allow incremental installation, if required. Services to and from the process equipment (e.g. power, communications, and raw feed water (ocean water)) would comprise a mix of buried and overhead methods. - Brine Disposal System - the waste brine from the desalination process would be transferred via a pipeline to the existing nearby Belmont WWTW for disposal via the existing ocean outfall pipe. - Other infrastructure facilities include tank farm, chemical storage and dosing area, fire water

Construction Phase	Typical activities	Indicative Duration	Noise Related Aspects and Impacts
			system, process tankage, administration building, workshop building and switch rooms, pipe laydown area. Peak noise impact works during the construction of the infrastructure area will be required at certain times and will include the use of (but not limited to): excavators, graders cranes and lifting equipment. These works would be predominately undertaken during standard hours.
Commissioning	Testing and commissioning of individual process units and then entire plant. Out-of-specification water to be discharged to WWTW ocean outfall.	1-2 months	These works would be predominately undertaken during standard hours. However, some activities may need to be undertaken outside of standard hours if deemed necessary. These activities will be assessed on an as needed basis should they be required.
Demobilisation	Removal of redundant environmental and safety controls. General site tidy up activities.	As required	These works would be predominately undertaken during standard hours.

6.2. Construction Noise Impacts

6.2.1. Site Construction Noise Impacts

The predicted noise levels at each receiver in comparison to the associated noise levels in the environmental assessment documentation are presented in Table 6-2. Predicted noise results indicate that, during standard construction hours, no noise impacts are expected.

Works outside of standard hours are predicted to be below the Outside of Standard Hours NML at the nearest residential receiver. Noise levels in the environmental assessment documentation associated with construction work outside of Standard Hours are presented in Table 6-3.

Generally, construction work will be undertaken in standard construction hours whenever practicable and/or timetabled in accordance with Section 5.1. Some activities (i.e. tunnelling, deliveries, dewatering, compound night works and crane activities) will occur outside of the standard hours in accordance with the Environmental Assessment Documentation and the Out-of-Hours-Work Protocol (Appendix B).

Table 6-2: Predicted Noise Impacts at Nearest Receiver – Standard Construction Hours

Stage	Receiver	Predicted noise level – LA _{eq,15min} dB(A)		NMLs LA _{eq,15min} dB(A)	Predicted Noise Impact above NMLs?
		EIS/ AR	Modification		
Desalination plant earthworks and hardstand	Nine Mile Beach	57	60	65	No
	33 Williams Street, Belmont	39	42	48	No
Wet well / Sea water pump construction	Nine Mile Beach	58	58	65	No
	33 Williams Street, Belmont	36	36	48	No
Pipe Jacking/Micro-Tunnelling (Standard Hours)	Nine Mile Beach	54	53	65	No
	33 Williams Street, Belmont	40	39	48	No
Intake Dewatering	Nine Mile Beach	43	48	65	No
	33 Williams Street, Belmont	22	27	48	No
Compound (Peak of Construction)	Nine Mile Beach	52	55	65	No
	33 Williams Street, Belmont	36	39	48	No
Intake structure connection	Nine Mile Beach	31	41	65	No
	33 Williams Street, Belmont	23	33	48	No
Intake structure connection - piling	Nine Mile Beach	31	48	65	No
	33 Williams Street, Belmont	23	40	48	No

Table 6-3: Predicted Noise Impacts at Nearest Receiver – Outside of Standard Construction Hours

Stage	Receiver	Predicted noise level – LA _{eq,15min} dB(A)		NMLs LA _{eq,15min} dB(A)	Predicted Noise Impact above NMLs?
		EIS/ AR	Modification		
Pipe Jacking/Micro- Tunnelling (OOHW)	Nine Mile Beach	54	52	65	No
	33 Williams Street, Belmont	40	38	38	No
Intake Dewatering	Nine Mile Beach	43	46	65	No
	33 Williams Street, Belmont	22	25	38	No
Compound (Night Activities)	Nine Mile Beach	52	50	65	No
	33 Williams Street, Belmont	36	34	38	No
Crane Operation for Main Plant Works	Nine Mile Beach	-	45 ¹	65	No
	33 Williams Street, Belmont	-	31	38	No

Note 1 – As this is a new construction noise stage, no EIS/ Amendment Report noise levels at receivers are available. Instead, noise levels were adjusted from the Pipe Jacking/Micro- Tunnelling (OOHW) stage, as the closest analogue for this stage.

A site plan showing the indicative location of construction plant and equipment, as identified in the Modification Report, is provided in Figure 6-1 below. The indicative list of equipment proposed for utilisation is included in Table 6-4.



Figure 6-1: Site Plan from the Modification Report showing indicative location of construction equipment (Jacobs, 2024)

Sound power levels for various equipment for use at the site have been identified in the modification report (Table 6-1 of the Construction Noise Assessment). The list of equipment and levels are included in the table below. Should plant and equipment that exceed the nominated sound power levels, the plant and equipment would be subject to further assessment. The assessment would include, but not be limited to siting within the construction site, hoarding options and other reasonable and feasible mitigation measures.

Table 6-4: Sound Power Level – Onshore Equipment

Construction Noise Stage	Equipment	Quantity	Equipment Noise Level SWLAeq 15 mins
Desalination plant earthworks and hardstand	Dozer	1	107
	15t Excavator	2	107
	45t Excavator	1	112
	Compressor	1	101
	Generator	1	99
	Concrete pump	1	108
	14t Vibratory roller	2	109
	Grader	1	110
	Water cart	1	101
	Concrete truck	1	109
	Plate Compactor	2	108
	Articulated Dump Truck	2	100
	Heavy vehicles	10	107
	Light vehicles	2	78

Construction Noise Stage	Equipment	Quantity	Equipment Noise Level SWLAeq 15 mins
Out of Hours Crane Operations for Main Plant Works	15t Excavator	1	107
	Generator	1	99
	Franna Crane	1	104
	Hand tools	2	102
	Welding equipment	1	105
Wet well/sea water pump station construction	Pump	1	97
	Generator	1	90
	Welding equipment	1	101
	15t Excavator	1	99
	30t Crane	-	98
	100t Crane	1	104
	Concrete saw	1	117
	Heavy vehicles	4	108
Pipe Jacking/Micro-Tunnelling (Standard Hours)	Auger Drill Rig	1	116
	Boring Jack Power Unit	1	112
	Drill Rig Truck	1	115
	15t Excavator	1	99
	Heavy vehicles	2	108
	30t Crane	-	98
	250t Crane	1	108
	100t Crane	1	104
	1500 kVA Generator	2	107
	Sump pumps	-	97
	Slurry pumps	1	103
	Surface water supply pump	1	108
	Water Separator	1	110
Pipe Jacking/Micro-Tunnelling (OOHW)	Auger Drill Rig	1	116
	Boring Jack Power Unit	1	112
	Drill Rig Truck	1	115
	15t Excavator	0	99
	Heavy vehicles	0	108
	30t Crane	-	98
	100t Crane	1	104
	1500 kVA Generator	2	107
	Sump pumps	-	97
	Slurry pumps	1	103
	Surface water supply pump	1	108
	Water Separator	1	110
Intake Dewatering	Generator	3	97
	Pump	3	99

Construction Noise Stage	Equipment	Quantity	Equipment Noise Level SWLAeq 15 mins
Compound (peak of construction)	Excavator	2	107
	Delivery trucks	5	107
	Light vehicles	20	78
Compound (Night Activities)	Excavator	-	107
	Delivery trucks	1	107
	Light vehicles	5	78

6.2.2. Construction Traffic Noise

Construction traffic noise from the Project was assessed using the Transport for NSW (TfNSW) Construction and Maintenance Noise Estimator Tool. Road traffic noise predictions were made at the nearest noise sensitive receivers to each of the roads in the primary route. Further assessment was undertaken as part of the Submissions report which found that, residential receivers whose building facades are closest to the road along the Pacific Highway, Beach Street, Hudson Street and Ocean Park Road will experience traffic noise greater than the applicable traffic noise assessment level. However, due to the significant existing traffic on the Pacific Highway, the addition of the construction traffic would not increase the overall traffic noise level of the Pacific Highway by more than 2 dB(A) and hence any actual change in traffic noise would be limited along this road. Predicted construction traffic noise levels are presented in Table 6-5.

To manage impacts associated with construction traffic noise the following mitigation measure will include:

- Scheduling construction traffic movements, especially heavy vehicles, to minimise night periods
- Reducing the speed of construction related heavy vehicle traffic to 40 km/hour along Beach Street and Ocean Park Road and to 20 kilometre per hour (km/hr) within the Project area
- Organising consultations and messaging (letterbox drops, phone calls, etc) to alert and inform residents along the affected construction traffic routes (heavy and light vehicle movements). Consultation should include, as a minimum, the predicted noise levels along the construction traffic routes and the timings of traffic movements.

Further mitigation measures applicable to traffic along Beach Street, Hudson Street and Ocean Park Road will be implemented in accordance with the CTPMSP.

Table 6-5: Predicted Construction Traffic Noise Level at Nearest Sensitive Receiver

Road	Time	Existing Traffic Noise Level dB(A), L _{Aeq,1h}	Construction traffic noise level dB(A), L _{Aeq,1h}	Increase in traffic noise level dB(A)	Traffic noise mitigation level dB(A), L _{Aeq,1h}	Construction traffic noise greater than traffic noise mitigation level?
Pacific Highway	Day (7AM – 10PM)	76.3	76.4	0.1	60	No, construction traffic noise is greater than RNP noise level, but noise level increases by less than 2dB.
	Night (10PM – 7AM)	71.9	72.1	0.2	55	No, construction traffic noise is greater than RNP noise level, but noise level increases by less than 2dB.

Road	Time	Existing Traffic Noise Level dB(A), $L_{Aeq,1h}$	Construction traffic noise level dB(A), $L_{Aeq,1h}$	Increase in traffic noise level dB(A)	Traffic noise mitigation level dB(A), $L_{Aeq,1h}$	Construction traffic noise greater than traffic noise mitigation level?
Beach Street	AM Peak (6AM – 7AM)	64.6	68.9	4.3	50*	Yes, construction traffic noise is greater than RNP noise level and noise level increases by more than 2dB.
	PM Peak (6PM – 7PM)	62.4	67.9	5.5	55*	
Hudson Street	AM Peak (6AM – 7AM)	56.7	59.3	2.6	50*	
	PM Peak (6PM – 7PM)	54.7	57.3	2.6	55*	
Ocean Park Road	AM Peak (6AM – 7AM)	56.1	66.2	10.1	50*	
	PM Peak (6PM – 7PM)	53.4	63.4	10.1	55*	

Note – The NSW Road Noise Policy (DECCW, 2011) defines the 'Day' period as the time between 7AM and 10PM, while it defines the 'Night' period as the time between 10PM and 7AM. As such, the AM Peak (6AM – 7AM) traffic noise has been compared against the hour 'Night' criteria, while the PM Peak (6PM – 7PM) traffic noise has been compared against the 1-hour 'Day' criteria.

6.3. Construction Vibration Impacts

6.3.1. Construction Vibration Sources

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

- Vibratory rollers
- Vibratory Piling Rig
- Plate compactors
- Padfoot rollers
- High-impact rollers
- Haul truck traffic

The main sources of vibration during construction of the Project will be associated with the use of vibratory rollers, padfoot rollers and high impact rollers. These types of rollers produce noticeable vibration and are likely to be used throughout the construction of the Project (i.e. desalination plant earthworks and hardstand

and water treatment process structures). Based on the indicative type of equipment that is going to be used for construction and the distance between construction areas and receivers, it is not expected that there will be vibrational impacts on nearby sensitive receivers.

Vibration from truck movements on roads may result in potential impact at sensitive receivers in terms of annoyance to human comfort, and potential impact to buildings located immediately adjacent to the heavy vehicle construction access route along Beach Street and Ocean Park Road. Vibration levels have been predicted at distances from the road carriageways representative of the nearest sensitive receivers on the north and the south sides of Beach Street and Ocean Park Road. The risk of more substantial impacts such as structural damage to receiver buildings, or health impacts to occupants living in nearby receiver buildings is expected to be negligible.

The predicted haul truck vibration level would comply with the adopted criteria of 0.28 mm/s PPV for truck passbys during the daytime period (7AM to 10PM), and 0.20 mm/s PPV for passbys during the night time period (10PM to 7AM). The predicted vibration level would also readily comply with the adopted criteria of 9.5 mm/s for minor cosmetic damage to sensitive receiver buildings. Predicted vibration levels for haul trucks is presented in Table 6-6.

Table 6-6: Predicted vibration levels at nearest receivers from haul truck traffic on Beach St/ Ocean Park Rd

Truck Type	Truck Load	Predicted vibration level at nearest sensitive receivers (PPV, mm/s)	
		Truck in Near Lane (distance approx. 8.0m)	Truck in Far Lane (distance approx. 11.5m)
B-Double	Full	0.18	0.15
	Empty	0.11	0.095
Truck & Dog	Full	0.16	0.13
	Empty	0.091	0.076
Rigid Truck	Full	0.11	0.092
	Empty	0.071	0.059

Impacts from vibration during construction are therefore considered as low environmental risk within the Environmental Approval Documentation. Further review of mitigation measures as part of the modification concluded that vibration impacts are consistent with the original assessment undertaken and no additional mitigation measures regarding vibration are proposed for construction. A detailed heritage assessment carried out as part of the EIS did not identify any heritage items as being potentially impacted by vibration for the Project.

6.4. Marine Impacts

6.4.1. Generation of Underwater Noise

The generation of underwater noise is associated with the construction of the DOI structure, associated jack up barge operation and marine vessel movements. During construction and where activities that generate underwater noise cannot be timed to occur outside of peak migration months (i.e. between May to June and September to November) the mitigation measures in Section 7.1 will be implemented.

6.5. Cumulative impacts

Cumulative noise and vibration impacts may arise from the interaction of other approved SSI / SSD projects in the area.

Works will be scheduled with the aim of minimising concurrent works near sensitive receivers in consultation with managers of other nearby projects that are likely to result in a cumulative impact. This will include coordination between other projects as necessary throughout the duration of construction.

7. Environment Control Measures

7.1. Noise and Vibration Mitigation and Management Measures

In accordance with the CoA, mitigation measures will be implemented with the aim of achieving the construction noise management levels and vibration criteria detailed in Section 5. Specific measures and requirements to address contract specifications, CoA and REMMs in relation to impacts from noise and vibration are outlined in Table 7-1.

Table 7-1: Noise and vibration management and mitigation measures

Ref	Measure / Requirement	Timing / Frequency	Responsibility	Reference / Source
NV1	All employees, contractors and subcontractors will receive an environmental induction. The induction will include: • All relevant Project specific and standard noise and vibration mitigation measures • Relevant licence and approval conditions • Permissible hours of work • Location of nearest sensitive receivers • Employee parking areas • Designated loading/unloading areas and procedures • Site opening/closing times (including deliveries) • Environmental incident procedures.	Pre-construction, Construction	Project Environment Manager (or delegate)	REMM
NV2	• No swearing or unnecessary shouting or loud stereos/radios on site. • No dropping of materials from height, throwing of metal items and slamming of doors.	Pre-construction, Construction	Project Environment Manager (or delegate)	REMM
NV3	Equipment Selection – JH will use quieter and less vibration emitting construction methods where reasonable and feasible.	Pre-construction, Construction	Project Environment Manager (or delegate)	REMM
NV4	Ongoing stakeholder consultation will occur including: • Establishing contact with local residents and the construction program and progress communicated on a regular basis, particularly when noisy activities are planned • Notifying affected receivers of the intended work, its duration and times of occurrence. This may include a local community update letters for specific construction activities and a Project info line • Specific notifications will be provided to receivers where the highly noise affected level of 75 dB(A) is predicted to be exceeded.	Pre-construction, Construction	Project Environment Manager (or delegate)	REMM

Ref	Measure / Requirement	Timing / Frequency	Responsibility	Reference / Source
NV5	Use and Siting of plant: Simultaneous operation of noisy plant within discernible range of a sensitive receiver will be avoided, where possible. The offset distance between noisy plant and adjacent sensitive receivers will be maximised as far as possible	Construction	Project Environment Manager (or delegate)	REMM
NV6	Noise and Vibration – Traffic Noise JH will undertake the following during construction activities: - Comply with the recommended standard construction hours - traffic flow, parking and loading/unloading areas to minimise reversing movements within the site - Loading and unloading of materials/deliveries is to occur during standard construction hours - Contractors are to avoid dropping materials from height where practicable, during loading and unloading - Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible - Heavy vehicles will be scheduled to arrive on site during standard construction hours i.e. 7AM and 6PM, where practicable and any necessary out of hours heavy vehicle movements will be managed through the Out of Hours Protocol to be provided in the Project's Conditions of Approval	Construction where reasonable and feasible	Project Environment Manager (or delegate)	REMM
NV7	Vibration monitoring - Vibration monitoring will be undertaken where equipment is being used within the safe working distances detailed in Table 7-41 of the EIS or when a complaint is received. Vibration monitoring will be conducted during these activities at the most susceptible buildings close to the construction sites - vibration measurement will be undertaken by a qualified professional and with consideration to the ICNG guidelines.	Construction	Project Environment Manager (or delegate)	REMM
NV8	Complaints Management – Complaints will be managed in accordance with the CEMP and the procedure outlined below. Signage will clearly and visibly provide a contact number and name to receive complaints and enquiries about	Construction	Project Environment Manager (or delegate)	REMM

Ref	Measure / Requirement	Timing / Frequency	Responsibility	Reference / Source
	construction. Potential complaints specific to these works could include: - Vibration impacts from works that significantly affect structures or dwellings - A cluster of noise and/or vibration complaints Works have the potential to cause noise complaints from nearby receivers. The response will be to: - Verbally respond to complainant - a written response within seven calendar days if the complaint cannot be resolved verbally - the complaint, and any actions taken with regards to the complaint within a complaints register - Undertake monitoring at the complainant's residence(s) - Investigate the nature and reasons of the impact - Investigate and implement further mitigation measures to minimise the impact.			
NV9	High Noise Intensive Works - Hours for highly noise intensive works will be undertaken in accordance with the EPA's requirements.	Construction	Project Environment Manager (or delegate)	REMM
NV10	Conditions of Approval – Hunter Water will commit to undertaking the required Noise and Vibration specifications in the conditions of approval.	Construction	Project Environment Manager (or delegate)	REMM
NV11	Respite Periods – High noise generating activities may only be carried out in continuous blocks, not exceeding three hours each, with a minimum respite period of one hour between each block. High noise refers to construction noise impacts which exceed the highly affected noise management level of 75 dB(A) LAeq(15- min) at the nearest sensitive receiver during standard construction hours. JH will undertake high noise generating activities in accordance with the CoA.	Construction	Project Environment Manager (or delegate)	REMM
NV12	Any annoying characteristics (such as tonality, low frequency, impulsiveness, etc.) generated by the site will need to have corrections factors applied, as per the NPI. This will need to be assessed as part of the detailed design stage where specific operational equipment is selected.	Detailed Design	JH Design team	REMM

Ref	Measure / Requirement	Timing / Frequency	Responsibility	Reference / Source
NV13	The following design strategies will be incorporated into the detailed design of the desalination plant: Selection of equipment and plant items to limit noise emissions. Where practical and feasible, motor drives, gear boxes, pumps, etc. will be specified and selected to achieve a noise level of less than 85 dB(A) at a distance of one metre, consistent with occupational health and safety requirements Purpose built acoustic enclosures to be provided where required for large plant items in order to achieve noise levels of less than 85 dB(A) at one metre.	Detailed Design	JH Design team	REMM
NV14	Construction Noise – JH will manage the total noise from construction of the project especially when undertaking noisy activities to minimise the risk that the combined noise will lead to higher than predicted noise at nearby receivers. JH will implement the noise monitoring program as approved. JH will also keep up to date with other planned construction activities within the vicinity of the project and assess cumulative impacts if necessary.	Construction	Project Environment Manager (or delegate)	REMM
NV15	Construction Traffic – The following measures will be implemented to manage construction traffic noise: - Schedule construction traffic movements, especially heavy vehicles, to minimise night periods - the speed of construction related traffic to 40 km/hour along Beach Street and Ocean Park Road and to 20 km/hr within the Project area - Organise consultations and messaging (letterbox drops, phone calls, etc) to alert and inform residents along the affected construction traffic routes. Consultation should include, as a minimum, the predicted noise levels along the construction traffic routes and the timings of traffic movements.	Construction	Project Environment Manager (or delegate)	REMM, EIS Section 7.1
NV16	Helicopter Noise – The following measures will be implemented to manage construction helicopter noise: Schedule helicopter movements so that they occur within 6:00AM and 7:00 PM and avoid night periods to the	Construction	Project Environment Manager (or delegate)	REMM, EIS Section 7.1

Ref	Measure / Requirement	Timing / Frequency	Responsibility	Reference / Source
	greatest extent possible, unless required for emergencies Operate all helicopters associated with the Proposed Modification in line with the noise management requirements of the Lake Macquarie Airport General Conditions of Use and the general 'Fly Neighbourly' Principles. JH will undertake all helicopter operation in accordance with the Helicopter Transportation Plan as approved.			
NV17	Prior to commencing construction and after completion of construction, a condition assessment will be offered to houses along Beach Street, Belmont South. A written and photographic report will be prepared to document the condition of buildings and structures. A copy of the report will be provided to the relevant landowner or land manager. This condition assessment will be the responsibility of HWC. JH will assist in the development if this assessment as required.	Pre-construction/ Construction/ post Construction	HWC	REMM
NV18	B2. No later than one month before the commencement of construction, a Community Communication Strategy must be prepared and submitted to the Planning Secretary for approval. The Community Communication Strategy is to provide mechanisms to facilitate communication between the Proponent, the Council and the community (including adjoining affected landowners and businesses, and others directly impacted by the development), during the design and construction of the development. The Community Communication Strategy must: c) detail a procedure for consulting with nearby sensitive receivers to schedule high noise generating works, vibration intensive activities or manage traffic disruptions JH will develop and implement the CCS as approved by Planning.	Pre-construction/ Construction	Project Environment Manager (or delegate)	CoA B2(c)
NV19	C11. Prior to the commencement of construction, the Proponent must submit a Construction Environmental Management Plan (CEMP) to the to the Planning Secretary for approval. The CEMP must include, but not be limited to, the following: i) Construction Noise and Vibration Management Sub-Plan (see condition C19); JH will maintain the CEMP and sub plans as required under the CoA.	Pre-construction/ Construction	Project Environment Manager (or delegate)	CoA C11(i)

Ref	Measure / Requirement	Timing / Frequency	Responsibility	Reference / Source
NV20	C18. The Construction Traffic and Pedestrian Management Sub-Plan (CTPMSP) must be prepared to achieve the objective of ensuring safety and efficiency of the road network and address, but not be limited to, the following: e) A Driver Code of Conduct must be prepared and communicated by the Proponent to heavy vehicle drivers and must address the following: (iii) minimise road traffic noise A driver's code of conduct is included in the CTPMSP.	Pre-construction/ Construction	Project Environment Manager (or delegate)	CoA C18(e)
NV21	Artificial noise emissions • Where activities that generate underwater noise cannot be timed to occur outside of peak migration months the following mitigation measures and controls may be implemented. Where this is not possible, the need for Marine Fauna Observers will be determined on the basis of construction timeframes. • Acoustic harassment/deterrent devices could be sounded prior to commencement of any underwater activity to provide opportunity for sensitive marine fauna to relocate temporarily. • Vessel machinery will be maintained in accordance with the manufacturer specifications to reduce noise emissions. • The interaction of all vessels with cetaceans and whale sharks will be compliant with Part 8 of the Environment Protection and Biodiversity Conservation (EPBC) Regulations (2000). The Australian Guidelines for Whale and Dolphin Watching (Commonwealth of Australia, 2017)) for sea-faring activities will be implemented across the entire Project. Including a. within 300 metres of a cetacean avoid making loud or sudden noises. b. not playing recorded or amplified sound underwater within 300 metres of a cetacean.	Pre-construction/ Construction	Project Environment Manager (or delegate)	REMM
NV22	Prior to installation of mechanical plant and equipment: a) a detailed assessment of mechanical plant and equipment with compliance	Design, Construction - Prior to installation of	Project Environment Manager (or delegate)	CoA

Ref	Measure / Requirement	Timing / Frequency	Responsibility	Reference / Source
	with the relevant project noise trigger levels in accordance with the Noise Policy for Industry (EPA, 2017) must be undertaken by a suitably qualified person; and b) evidence must be submitted to the Planning Secretary that any noise mitigation recommendations identified in the assessment carried out under (a) above have been incorporated into the design to ensure the development will not exceed the relevant project noise trigger levels in accordance with the Noise Policy for Industry (EPA, 2017).	mechanical plant and equipment		
NV23	D7. Except as permitted by an EPL, highly noise intensive works that result in an exceedance of the noise affected NML at the same receiver must only be undertaken: c) between the hours of 8:00 am to 6:00 pm Monday to Friday; d) between the hours of 8:00 am to 1:00 pm Saturday; and e) if continuously (any period during which there is less than one hour between ceasing and recommencing any highly noise intensive work), then not exceeding three (3) hours), with a minimum cessation of highly noise intensive work of not less than one hour. Notes: 1. As a guide, Work should be carried out in continuous blocks that do not exceed three hours each with a minimum respite period of one hour between each block. 2. Noise affected NML is defined as RBL + 10 dB as defined in the ICNG.	Construction	Project Environment Manager (or delegate)	CoA
NV24	The Proponent must ensure construction vehicles (including concrete agitator trucks) do not arrive at the site outside of the construction hours of work outlined under condition D3. JH will implement the Construction Traffic and Pedestrian Management Sub- Plan, as approved.	Construction	Project Environment Manager (or delegate)	CoA
NV25	Prior to the commencement of operation, the Proponent must submit evidence to the Certifier that the noise mitigation recommendations in the assessment undertaken under condition C24 have been incorporated into the design of mechanical plant and equipment to ensure the	Prior to the commencement of operation	Project Environment Manager (or delegate)	CoA

Ref	Measure / Requirement	Timing / Frequency	Responsibility	Reference / Source
	development will not exceed the recommended operational noise levels as specified within the Noise Policy for Industry (2017). JH will submit all required documentation as required by the condition.			
NV26	A site Notice will be displayed on the front gate showing: The approved hours of work, the name of the site/ project manager, the responsible managing company (if any), its address and 24-hour contact phone number for any inquiries, including construction/ noise	Prio to the commencement of construction	Project Environment Manager (or delegate)	CoA

7.2. Minimising vibration impacts

The pattern of vibration radiation is very different to the pattern of airborne noise radiation and is very site specific. Final vibration levels are dependent on many factors including the actual plant used, its operation and the intervening geology between the activity and the receiver.

Recommended minimum working distances presented in the following sections provide a conservative screening method for indicating buildings and structures where there is a risk of vibration impact. Vibration monitoring would be carried out to confirm the minimum working distances at specific sites, where vibration significant plant is required to operate within or near the recommended minimum working distances.

7.2.1. Human exposure

Many building occupants assume that building damage is occurring when they feel vibration or observe rattling of loose objects, however the level of vibration at which people perceive vibration or at which loose objects may rattle is far lower than vibration levels that can cause damage to structures. At properties near the construction works, nearby receivers may be able to feel vibration when vibration-generating equipment is being utilised. For this reason, it is appropriate to identify properties where there is a probability of adverse comment so that impacts can be managed.

Recommended minimum working distances for typical vibration intensive construction equipment for human comfort (response) are shown in Table 7-2. These recommended distances relate to continuous vibration and are presented as a guide only. For most construction activities, vibration emissions are intermittent in nature and for this reason, higher vibration levels occurring over shorter time periods are allowed.

Table 7-2: Recommended minimum working distances (m) - human comfort (response)

Vibration significant plant item	Residence (Day)	Residence (Night)	Office	Workshop
Concrete saw	10	10	5	5
Excavator (tracked) ≤ 5t + hydraulic hammer	20	20	15	10
Excavator (tracked) ≤ 15t + hydraulic hammer	20	25	15	10
Excavator (tracked) ≤ 35t + hydraulic hammer	25	30	20	15
Percussive drill (small)	10	15	5	5
Piling rig – bored (rock)	15	15	10	10
Piling rig – bored (soft ground)	10	10	5	5
Piling rig - vibratory driven	170	225	100	55
Pneumatic hammer (jackhammer)	15	20	10	5
Terrain leveller	15	20	5	5
Vibratory roller (11t) padfoot - High vibration	70	90	40	25
Vibratory roller (11t) padfoot - Low vibration	60	80	35	20
Vibratory roller (13t) smooth drum - High vibration	55	75	30	15

Vibration significant plant item	Residence (Day)	Residence (Night)	Office	Workshop
Vibratory roller (13t) smooth drum - Low vibration	40	55	20	10
Wacker packer	10	15	5	5

7.2.2. Buildings and structures

Recommended minimum working distances to reduce the risk of cosmetic damage to buildings or structures from typical vibration intensive construction equipment are presented in Table 7-3. These are aimed at reducing the risk of cosmetic damage (as per BS 7385:1993 and DIN 4150-3:2016) and are based on the vibration screening criteria set in Section 5.3. Vibration limits for underground services within the vicinity of the Project will be managed in accordance with the utility owner and the limits defined in Section 5.3.4.

Unlike noise, vibration cannot be readily predicted. The minimum working distances below are indicative and will vary depending on the plant item, building types and foundations and local geotechnical conditions. Vibration monitoring would be carried out to confirm the site specific minimum working distances for this Project.

Table 7-3: Minimum working distances (m) - cosmetic damage¹

Vibration significant plant item	Reinforced or frame structures (BS7385) ²	Unreinforced or light framed structures (BS7385) ²	Structurally unsound heritage structures (DIN 4150-3) ³
Concrete/ road saw	5	5	5
Excavator (tracked) ≤ 15t + hydraulic hammer	5	5	10
Excavator (tracked) ≤ 35t + hydraulic hammer	5	10	10
Excavator (tracked) ≤ 50t + hydraulic hammer	5	10	20
Drill Rig	5	5	10
Pneumatic hammer (jackhammer)	5	5	5
Piling rig – bored (rock)	5	5	5
Piling rig – bored (soft ground)	5	5	5
Piling rig - impact hammer (high)	15	30	65
Piling rig - impact hammer (typical)	10	15	35
Piling rig - vibratory driven	10	20	50
Terrain leveller	5	5	5
Vibratory roller ≤ 25t padfoot	5	10	20
Vibratory roller ≤ 13t smooth drum - High vibration	5	5	15
Vibratory roller ≤ 13t smooth drum - Low vibration	5	5	10
Wacker packer	5	5	5

NOTES:

1. Minimum working distances are in 5m increments only to account for the intrinsic uncertainty of this screening method
2. Minimum working distance based on vibration screening criterion which reduced the cosmetic damage levels set by BS7385 by 50% due to potential dynamic magnification.
3. A building condition inspection should determine whether a heritage item is structurally unsound.

7.3. Management of Out-of-Hours Work

7.3.1. Emergency work

Where out of hours work is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm, the Project Environmental Manager (or delegate) will notify the ER, HWC. HWC will notify the Planning Secretary and the EPA of the need for the emergency works. In addition, the construction team will use best endeavours to notify all affected sensitive land uses of the likely impact and duration of the emergency work.

7.3.2. Out-of-Hours Work Procedure

An Out-of-Hours Works Protocol (OOHW Protocol) has been prepared (see Appendix B) in accordance with CoA C29. The OOHW Protocol provides a process for the consideration, management and approval of work outside of the approved construction hours detailed in Section 5.1. The OOHW Protocol will be approved by the Planning Secretary before commencement of the Out-of-Hours Work and will be prepared in consultation with the ER and EPA.

The aim of the OOHW Protocol is to ensure that OOHW, follows a rigorous process to identify the associated risk of adverse impacts on sensitive land uses with regards to the OOHW and include, but not be limited to:

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

7.3.3. Community consultation on respite

In accordance with the consultation requirements outlined in NSW CoA B2(f)(iii), B2(f)(iv), CoA C29(e) and C29(f), and CoA Appendix 4, the community will be consulted to determine appropriate respite periods for OOHW at noise affected locations. The consultation will include (but not be limited to) providing the community with:

- justification and description of the potential work, location and duration of the out-of-hours work;
- the noise characteristics and likely noise levels of the construction / activity(ies) being undertaken;
- mitigation and management measures which aim to achieve the relevant NMLs and vibration criteria under Conditions D13 and D16 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers); and
- respite periods.

Consultation will be undertaken using a range of consultation methods to optimise community engagement across the different land use types identified. This may include phone calls, door knocks, calling cards, emails or community information sessions. Community consultation will also be undertaken in accordance with the Community Communication Strategy (CCS).

The affected community's preference for alternative hours and/or durations will be considered when confirming the schedule. The outcomes of the community consultation, the identified respite periods and the scheduling of the likely OOHW will be included in OOHW application and will be provided to the, ER and Planning Secretary for approval prior to the work occurring.

7.3.4. Road traffic noise

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

- Restricting heavy vehicle movements to approved standard hours as far as possible; and/or
- Planning heavy vehicle access in accordance with the approved Construction Pedestrian and Traffic Management Plan.

Details regarding heavy vehicle traffic movements, including hours and haulage routes are detailed within the Construction Traffic and Pedestrian Management Sub-Plan (CTPMSP).

7.3.5. Co-ordination of OOHW with third parties

All OOHW, including works undertaken by a third party will be coordinated to implement the appropriate management measures and respite periods as specified in NSW CoA B2, C29 and CoA Appendix 4. JH and HW will liaise to identify and ensure that any potential OOHW undertaken by a local third party (i.e. telecommunications, power provider and/or HW itself in the case of Belmont WWTW) is timed such that cumulative OOHW impacts are not received by the community so far as practicable.

Steps to ensure appropriate respite is provided is discussed within Appendix B. Notification arrangements for affected receivers for approved out-of-hours work and notification to the Planning Secretary of approved low risk out-of-hours works is also discussed within Appendix B.

In accordance with A7 of the CoA, where high risk works are being undertaken concurrently with a third party:

Where conditions of this approval require consultation with an identified party, the Proponent must:

- (a) consult with the relevant party prior to submitting the subject document to the Planning Secretary for approval; and*
- (b) provide details of the consultation undertaken including:*
 - (i) the outcome of that consultation, matters resolved and unresolved; and*
 - (ii) details of any disagreement remaining between the party consulted and the Proponent and how the Proponent has addressed the matters not resolved*

7.4. Community Consultation and Notification

Noise and vibration management information will be communicated to the community and stakeholders in accordance with the principles and procedures outlined in Section 7.3.3 and the Community Communication Strategy (CoA B2). JH will adhere as a minimum to the following principles and procedures relevant to noise and vibration management:

- Good engagement with the community will be maintained to facilitate effective delivery of the Project with consideration of community impact, including procedures for notifying residents, business owners and other sensitive land uses, of any noise- or vibration-intensive construction activities likely to affect their amenity
- 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 (Refer to Section 4.1) will be consulted prior to scheduling the construction works to identify periods during which they will be adversely affected by noise generating works in accordance with the Community Communication Strategy.
- Works will not be scheduled during the sensitive periods identified by the stakeholders unless alternative arrangements have been made (at no cost to the affected receiver) or the Planning Secretary has otherwise approved the works in accordance with CoA C29.

Further information on the procedures for managing community consultation and engagement, is provided in the Community Communication Strategy.

CoA C19 (g) and (h) require JH to include strategies that have been developed with the community for managing high noise generating works.

Following a thorough review of the Project documents, high noise (as defined in the ICNG) has not been identified as occurring during the construction and as such consultation with the community regarding strategies has not been undertaken. Should any activities that generate high noise be identified throughout the course of construction the following would be implemented:

- Consultation with the community in accordance with Section 7.2.3 of the CCS to identify strategies
- Update of the NVMP to include agreed strategies

7.5. Complaints Management

HWC will maintain a Complaints Register for the Project in accordance with the requirements of CoA B6. JH will provide any relevant complaints to HWC for inclusion. This process is defined within the Community Consultation Strategy.

HWC has established a Project email (desal@hunterwater.com.au), postal address (36 Honeysuckle Drive Newcastle), and free-call number for Project enquiries and complaints (XXXXXXX). Phone calls will be monitored during standard construction hours and while the Project is undertaking Out of Hours Works. All contact will be acknowledged, and responses provided in accordance with the timeframes outlined in the approved Communication Strategy.

The telephone number will be available for the duration of the work and from 12 months following completion of construction. All approaches from the community and stakeholders will be registered in the Project's Consultation Manager Stakeholder database managed by the Project community team.

The telephone number, postal and email address will be published on all the Project collateral (including the website), site signage and hoarding, and social media.

Records of all complaints received will include the following details as minimum (refer to CCS for full requirements):

- Date and time of the complaint.
- Method by which the complaint was made.
- Any personal details of the complainant provided by the complainant or, if no such details were provided, a note to that effect.
- Number of people in the household affected in relation to the complaint
- The nature of the complaint
- Means by which the complaint was addressed and whether resolution was reached, with or without mediation.
- If no action taken, reasons why.

The Project will circulate an updated copy of the complaints register by 5:00pm the day that the complaint has been received. The complaints register will be provided to HWC, and the ER. Personal details will not be included in the complaints register unless otherwise agreed to or requested by the complainant.

This information will be included in a Complaints Register, in accordance with CoA B6. The information contained within the register will be made available to the Planning Secretary upon request.

An initial response to noise and vibration complaints will be provided in accordance with the Project Communication Strategy defined complaint response times, generally as follows:

- Complaint received by call, text, or personal contact:

- Within 2 hours during standard construction hours and during out-of-work when construction is occurring.
- Otherwise, within 24 hours.
- Written complaint:
 - Acknowledged within 8 hrs.
 - Proposed action within 24 hrs (verbal or written where no phone number has been provided).
 - Detailed written response within 10 business days.

All complaints will be closed off in the stakeholder database. At all times the stakeholder will be kept informed of when they will receive a response.

The Project Environment Manager (or delegate) will apply an adaptive approach to ensure that corrective actions are applied in consultation with the appropriate construction staff to allow modifications and improvements in the management of any environmental issues resulting in community complaints.

Where requested by the Planning Secretary, the ER will assist in the resolution of community complaints.

7.6. Marine Management Measures

Noise and vibration management for offshore works and marine environments will be communicated to all JH personnel, including contractors as part of the site induction process. Mitigation measures associated with Marine biodiversity and offshore noise will be undertaken in line with the measures discussed in the Offshore Construction Works Management Sub-Plan.

7.6.1. Peak Migration Months

Marine mammals utilise the waters surrounding the project for migration and may be encountered during offshore construction activities. Annual peak migration months for marine species are defined as May to June and September to November.

The activities associated with the installation of the intake pipe will generate standard shipping noise associated with vessel movements between port environments and additional noise generated from the use of construction machinery. Disturbance to marine fauna (including avifauna) from above ground and underwater noise may occur in response to noise generated by vessel movements. Marine activities will be undertaken in accordance with the Offshore Construction Works Management Plan (OSCWMP).

The following controls will be implemented for the purposes of decreasing or mitigating the impact of noise on marine fauna:

- Wherever reasonable, activities that generate underwater noise will be timed to occur outside of peak migration months to reduce overlap with migratory movements and therefore reduce the potential threat to both migratory marine mammals and migratory marine birds. A Marine Fauna Observer will be deployed on the JUB at all times.
- Acoustic deterrent devices will be installed prior to commencement of any underwater activity to provide opportunity for sensitive marine fauna to relocate temporarily. These deterrent devices consistently operate at frequencies ranging from 3 – 120 kilohertz (kHz) and are spaced at varying intervals depending on marine mammal type (i.e. every 200 meters for porpoise / dolphins and every 100 meters for whales). As a result, these deterrent devices will be spaced at the above-mentioned intervals from the Jack Up Barge (JUB). These devices will be located in positions away from the JUB to deter cetaceans from entering within 300 m of the JUB, in a radius from the JUB. These devices produce randomised pings with harmonics while in use to prohibit habitation within the Project area.
- Vessel machinery will be maintained in accordance with the manufacturer specifications to reduce noise emissions.

- The interaction of all vessels with cetaceans, sharks and whale sharks will be compliant with Part 8 of the Environment Protection and Biodiversity Conservation (EPBC) Regulations (2000). Noise related requirements in accordance with Part 8 include:
 - avoid making loud or sudden noises within 300 metres of these species.
 - not playing recorded or amplified sound underwater within 300 metres of a cetacean.
- The Australian Guidelines for Whale and Dolphin Watching (Commonwealth of Australia, 2017)) for sea-faring activities will be implemented across the entire Project. Noise related requirements applicable to the project in accordance with these guidelines include:
 - re-positioning and constant re-starting of engines should be minimised where possible.
 - starting and running of engines should avoid rapid changes in revolutions and the departure of vessels should be controlled so that engine revolutions build up slowly
 - vessel operators and passengers should not intentionally make any noise to attract whales or dolphins. This includes underwater playback of recorded whale or dolphin sounds or song and hitting the side of the boat

7.7. Standard Management Measures

Table 7-4 outlines actions that can be applied to manage the potential for noise and vibration to impact on sensitive land uses near the works with reference to the ICNG and in accordance with the Infrastructure Approval. These standard mitigation measures apply to all works and will be implemented as appropriate.

Table 7-4: Standard management measures to reduce construction noise and vibration

Action Required	Applies to:	Details
Implement stakeholder consultation measures.	Airborne noise Ground-borne noise & vibration	Ongoing stakeholder consultation will occur including: • Establishing contact with local residents and the construction program and progress communicated on a regular basis, particularly when noisy activities are planned. • Notifying affected receivers of the intended work, its duration and times of occurrence. This may include a local community update letter for specific construction activities and a Project info line. • Specific notifications will be provided to receivers where the highly noise affected level of 75 dB(A) is predicted to be exceeded.
Construction hours and scheduling	Airborne noise Ground-borne noise & vibration	Where feasible and reasonable, construction will be carried out during the standard daytime working hours identified. Work generating noise with tonal and impulsive and high vibration levels should be scheduled during less sensitive time periods.
Traffic Noise	Airborne noise Ground-borne noise & vibration	The following measures will be implemented to manage construction traffic noise: • Schedule construction traffic movements, especially heavy vehicles, to minimise night periods. • Reduce the speed of construction related heavy vehicle traffic to 40 km/hour along Beach Street and Ocean Park Road and to 20 km/hr within the Project area. • Organise consultations and messaging (letterbox drops, phone calls, etc) to alert and inform

Action Required	Applies to:	Details
		residents along the affected construction traffic heavy vehicle route. Undertake noise monitoring in the event of a noise exceedance attributable to the Project.
Construction respite period	Ground-borne noise & vibration. Airborne noise	Noise with special audible characteristics and vibration generating activities (i.e. jack hammering, piling and vibratory rolling) may only be carried out in accordance with Section 5.1
Site inductions	Airborne noise Ground-borne noise & vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction will include: - All relevant project specific and standard noise and vibration mitigation measures - Relevant licence and approval conditions - Permissible hours of work - Location of nearest sensitive receivers - Employee parking areas - Designated loading/unloading areas and procedures. - Site opening/closing times (including deliveries) - Environmental incident procedures.
Behavioural practices	Airborne noise	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors.
Equipment Selection	Airborne noise	Use quieter and less vibration emitting construction methods where reasonable and feasible.
Use and siting of plant	Airborne noise	- Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be avoided. The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. - Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers.
Monitoring	Airborne noise Ground-borne noise & vibration	A noise monitoring program will be carried out for the duration of works in accordance with the Construction Noise and Vibration Monitoring Program and any approval and licence conditions.
Attended vibration measurements	Ground-borne vibration	- Vibration monitoring will be undertaken where equipment is being used within the safe working distances or if a complaint is received. Vibration monitoring will be conducted during these activities at the most susceptible buildings close to the construction sites. - Any vibration measurement will be undertaken by a qualified professional and with consideration to the ICNG guidelines.

Action Required	Applies to:	Details
Update Construction Environmental Management Plans	Airborne noise Ground-borne noise & vibration	The CEMP must be regularly reviewed to assess for any changes in noise and vibration management issues and strategies. The Project Environment Manager (or delegate) holds the responsibility for review and update of the plan.

Table 7-5 outlines the standard mitigation measures that should be applied “at the source” i.e. directly applied to plant and equipment to reduce noise and/or vibration from the work site.

Table 7-5: Standard ‘at source’ mitigation measures to reduce construction noise and vibration

Action Required	Applies to:	Details
Plan worksites and activities to minimise noise and vibration	Airborne noise Ground-borne vibration	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Equipment selection	Airborne noise Ground-borne noise & vibration	Use quieter and less vibration emitting construction methods where feasible and reasonable.
Maximum noise levels	Airborne-noise	The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the allowable noise levels. Plant or equipment that exceeds the nominated sound power level must not be used by the project, subject to further approval.
Rental plant and equipment	Airborne-noise	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the allowable noise levels.
Use and siting of plant	Airborne-noise	Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be avoided. The offset distance between noisy plant and adjacent sensitive land uses is to be maximised. Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive land uses.
Non-tonal reversing alarms	Airborne noise	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant for any out of hours work, including delivery vehicles.
Minimise disturbance	Airborne noise	Loading and unloading of materials/deliveries is to occur as far as possible from sensitive land uses.

Action Required	Applies to:	Details
arising from delivery of goods to construction sites		Select site access points and roads as far as possible away from sensitive land uses. Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible.
Prefabrication of materials off-site	Airborne noise	Where practicable, pre-fabricate and/or prepare materials off-site to reduce noise. Materials can then be delivered to site for installation.
Engine compression brakes	Airborne noise	Limit the use of engine compression brakes in local roads.

7.8. Additional noise and vibration mitigation measures

In instances where OOHW noise levels are predicted to exceed the NML at receivers, after the application of all reasonable and feasible noise mitigation and management measures (refer to Section 7.1), the CNVG directs that the Project should consider implementing the additional mitigation measures including:

- Notification (letterbox drop or equivalent) detailing work activities, time periods of which these will occur, expected levels of noise, impacts and mitigation measures. Notification of residents and businesses to be carried out in accordance with the CCS.
- Specific notifications (SN), which provide additional information when relevant and informative to more highly affected receivers than covered in general letterbox drops.
- Phone calls (PC), which detail relevant information to identified/affected stakeholders and provide personalised contact, tailored advice and the opportunity to comment on the proposed work.
- Individual briefings (IB), which inform stakeholders about the impacts of high noise activities and mitigation measures, and provide personalised contact, tailored advice and the opportunity to comment on the proposed work.
- Respite offers (RO), should be considered made where there are high noise and vibration generating activities near receivers to provide residents with respite from an ongoing impact.
- Respite period 1 (R1), where out-of-hours construction noise in OOHW Period 1 is generally limited to no more than two consecutive evenings, and a maximum of three evenings per week and 10 evenings per month.
- Respite period 2 (R2), where night-time construction noise in OOHW Period 2 is generally limited to two consecutive nights, and a maximum of three nights per week and 10 nights per month.
- Duration respite (DR), which is where the work duration, number of evenings or nights is increased so that the work activity can be completed more quickly.
- Alternative accommodation (AA)
- Tailored mitigation measure/s to individual circumstances (where engagement with affected stakeholder/s and/or resident/s has identified the need)
- Verification, including measurement of the background noise level and construction noise.

The additional mitigation measures required will be determined based on the time period works are being undertaken and the level of exceedance. Table 7-6 (extracted Table 9 of the CNVG 2023) details the triggers for additional mitigation measures for air-borne noise.

Table 7-6: Triggers for additional mitigation measures – airborne noise (CNVG 2023)

Perception	Predicted airborne $L_{Ae1(15min)}$ noise level receiver		Additional mitigation measures type	Mitigation levels
	dB(A) above RBL	dB(A) above NML		
All hours				
75 dB(A) or greater			N, V, PC, RO	HA
Standard Hours: Mon – Fri (7am – 6pm), Sat (8am – 5pm), Sun/Pub Hol (Nil)				
Noticeable	5 to 10	0	-	NML
Clearly audible	10 to 20	< 10	-	NML
Moderately intrusive	20 to 30	10 to 20	N, V	NML+10
Highly intrusive	> 30	> 20	N, V	NML+25
OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am & 5pm – 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				
<i>N – Notification</i> <i>SN – Specific Notification</i> <i>V – Verification</i> <i>IB – Individual Briefings</i> <i>RO – Respite Offer</i> <i>R1 – Respite Period 1</i>		<i>R2 – Respite Period 2</i> <i>DR – Duration respite</i> <i>PC – Phone calls</i> <i>AA – Alternative Accommodation (when noise impact is expected to be for more than two consecutive nights)</i> <i>HA – Highly Affected (>75 dB(A) – applies to residences only)</i>		

7.9. Noise Mitigation in Design

There are several CoA and REMMs that are to be managed as part of the Project detailed design preparation and review process. These will be documented as part of the relevant Design Packages, and will be subject to a design review process, including a review on compliance with relevant Project requirements.

The Project Design Management Plan describes the approach to Environment in Design (EID). It describes the activities involved with design input, output, verification, validation, and change control practices. It sets responsibilities for defining the verification method for each package/activity and establishing dates for the sequential review of environmental risks. The environment team will work closely with the design team to coordinate appropriate technical inputs from the broader Project team and relevant subject matter experts.

The design team(s) will maintain a register of EID requirements adapted from the CoA, EIS, this CEMP and associated Sub-Plans. A checklist shall be included in each design report for each individual design package which covers all relevant requirements from these documents.

8. Compliance Management

8.1. Roles and Responsibilities

The Project Team's organisational structure and overall roles and responsibilities are outlined in CEMP. Implementation of this plan is the responsibility of the Project Environmental Manager (or delegate).

8.2. Training

All project personnel, including contractors working on site will undergo site induction training and pre-start briefings relating to noise and vibration management issues. The induction training and pre-start briefings will address elements related to noise and vibration management including:

- Existence and requirements of this sub-plan
- Applicable and relevant legislative requirements
- EPL conditions (e.g. specifically noise and vibration management competency and maintenance of plant and equipment conditions)
- Roles and responsibilities for noise and vibration management
- Typical construction activities that may impact noise and vibration and associated environmental impacts.
- Procedure to be implemented in the event of an incident or exceedance in monitored exceedance limits.
- Noise and Vibration mitigation and management measures
- Out of Hours Work Protocol.

Targeted training in the form of toolbox talks or specific training will also be provided to personnel with a key role in noise and vibration management. Daily pre-start meetings conducted by the Superintendent / 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 the CEMP.

8.3. Monitoring and Inspection

Inspections of sensitive areas, mitigation measures, and activities which have the potential to generate noise and vibration impacts will occur for the duration of the Project. Requirements and responsibilities in relation to monitoring and inspections are documented in the CEMP.

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

All environmental monitoring equipment (if required) will be maintained and calibrated according to the manufacturer's specifications, and appropriate records will be kept. Non-conformance reporting protocols are outlined in Section 8.5 of this Plan and detailed further in the CEMP.

8.3.1. Noise monitoring

Attended monitoring of construction noise levels will be undertaken as follows:

- At the first opportunity within the first month of starting construction activities as well as monthly monitoring throughout the construction period to ensure the range of activities being undertaken at the site are measured to confirm noise predictions, the effectiveness of actions and mitigation measures.
- Where appropriate in response to a noise related complaint(s) (determined on a case-by-case basis);
- During sensitive periods (i.e. night works); and

- As directed by an authorised officer of the EPA (if relevant).

Monitoring would be undertaken at the potentially most exposed receivers in proximity to construction activities. Noise monitoring locations will consider factors including:

- The location of previous monitoring sites;
- The proximity of the receiver to a worksite;
- The sensitivity of the receiver to noise;
- Background noise levels;
- Safety; and
- The expected duration of the impact.

Where monitoring indicates that the construction noise levels are above the predicted levels, work practices would be reviewed, and further mitigation measures applied where reasonable and feasible.

The attended measurements will need to be carried out by an appropriately trained person in the measurement and assessment of construction noise, who is familiar with the requirements of the relevant standards and procedures.

8.3.2. Vibration monitoring

Attended vibration monitoring is to be undertaken as follows:

- At the commencement of construction for each plant or activity on site where the vibration screening criteria is likely to be exceeded, to refine the identified minimum working distances to suit site-specific conditions;
- Where vibration generating activities have the potential to impact on heritage items. In the event that the vibration monitoring shows that the preferred values for vibration are likely to be exceeded, an alternative, lower impact construction methodology would be considered;
- Where it is not feasible to modify construction methodology to reduce vibration intensive construction activities within the minimum working distances for cosmetic damage;
- For short periods of potential risk for cosmetic damage to buildings and structures (if work is identified to occur within safe working distances for cosmetic damage to buildings from vibration);
- Where deemed to be relevant to construction works in response to a vibration-related complaint; and
- As otherwise required by the noise and vibration assessments (or by an authorised officer of the EPA).

Where attended vibration monitoring is not feasible, due to extended periods of vibration intensive works, a permanent vibration monitoring system would be installed to warn plant operators (via flashing light, SMS alert, etc.) that there is potential cosmetic damage to buildings and structures.

8.3.3. Monitoring results assessment

All noise and vibration monitoring results for both construction related noise and vibration and heavy vehicle noise will be managed in accordance with of Section 5.3 of Appendix A.

8.4. Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this sub plan, CoA and other relevant approvals, licenses, and guidelines. These audits will be undertaken at planned intervals to provide information on whether the Project:

- Is meeting its compliance obligations.
- Conforms to this sub-plan.

- Determines if this Sub-plan is effectively implemented and maintained.

The approach to internal and independent audits, including audit requirements and the auditing schedule and management of environmental incidents are detailed in the CEMP.

8.5. Reporting

Reporting requirements relevant to the management of noise and vibration are identified in Table 8-1: Reporting requirements specific to noise and vibration management. Further information on the reporting of noise and vibration monitoring results is presented in the Monitoring Program (Appendix A of this Plan). Requirements and responsibilities for reporting are further described in the CEMP.

Accurate records will be maintained substantiating all construction activities associated with the Project or relevant to the conditions of approval, including measures taken to implement this CNVMP. Records will be made available to DPHI upon request, within the timeframe nominated in the request and as per EPL requirements as applicable.

Relevant information will be made publicly available in accordance with CoA Condition A24.

Table 8-1: Reporting requirements specific to noise and vibration management

Item	Frequency	Standards	External Reporting	Responsibility
Non conformance	At each occurrence	John holland Environmental Incident Classification and Reporting Procedure.	Depending on nature of non-conformance; ER and HWC in monthly reports or audit reports	Project Environment Manager (or delegate)
Incident and non-compliance reports	At each occurrence	Reporting of incidents and non-compliances in accordance with CoA, Environmental Incident Classification and Reporting Procedure.	Appropriate authority dependant on nature of the incident (e.g. EPA, DPHI) HWC	Project Environment Manager (or delegate) / HWC
Complaint register	Daily (ER, EPA) as received. DPHI as requested	Reporting of complaints, in accordance with the CoA and CCS, through the complaints register, to the ER and EPA for any complaints received (on the day they are received). Communication, notification and complaints handling requirements regarding Noise matters will be managed through the Complaints Management System administered by HWC	ER EPA (in accordance with EPL conditions) DPHI (as requested by the Secretary) HWC	Project Environment Manager (or delegate)
Weekly environmental inspection	Weekly	Inspection of the environmental controls and implementation including the measures outlined in Section 7.1	HWC ER	Project Environment Manager (or delegate)
Monitoring program reporting	as required	Reports to include analysis of the results including, but not limited to, exceedances of	ER / HWC	Project Environment Manager (or delegate)

Item	Frequency	Standards	External Reporting	Responsibility
On the basis of incident / complaint		relevant criteria/targets/goals, reasons for any exceedances, relevant noise and vibration descriptors. The report will also detail any management and mitigation measures that were implemented to address exceedances during the reporting period.		

9. Review and Improvement

9.1. Continuous Improvement

Continuous improvement of this Plan, the Construction Noise and Vibration Monitoring Program (Appendix A) and the OOHV Procedure (Appendix B) will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

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

The Project Environment Manager (or delegate) is responsible for ensuring stage-specific environmental risks are identified and included in the Project risk register and appropriate mitigation measures implemented throughout the construction, as part of the continuous improvement process. The process for ongoing risk identification and management during construction is outlined in the CEMP.

9.2. CNVMP Version Control

The processes described in the CEMP may result in the need to update or revise this Plan. Only the Project Environment Manager (or delegate) has the authority to approve changes to the requirements of this Plan. Minor amendments to the Plan may be approved by the ER (at Plannings discretion) in accordance with the CEMP and are to be implemented for the duration of construction and for any longer period set out in the monitoring programs or specified by the Planning Secretary, whichever is the greater. Amendments not considered minor by the ER need to be approved by the Planning Secretary.

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

Appendix A – Construction Noise and Vibration Monitoring Program

Refer to CS1135-WT-BEL-EN-PLN-0003 Construction Noise and Vibration Monitoring Program

Belmont Desalination Plant

Construction Noise and Vibration Monitoring Program

Document Number: CS1135-WT-BEL-EN-PLN-0003

Revision Number: 1

Issue Date: 13/11/2024

Revisions and Distribution

Revisions

Draft issues of this document are identified as Revision A, B, C, etc. Upon initial issue (generally Contract Award) this will be changed to a sequential number commencing at Revision 0. Revision numbers will continue at Revision 1, 2, etc.

Rev	Date	Prepared By [Name]	[Signature]	Reviewed By [Name]	[Signature]	Approved By [Name]	[Signature]	Remarks
A	15.04.2024	SG	SG	AG	AG	AG	AG	Issue to HWC as draft
B	12.08.2024	S. Grunsell	SG	A Grant J Nisbet	AG JN	S MacNish	SM	Revised Post modification
0	23.09.2024	S. Grunsell	SG	A Grant J Nisbet	AG JN	S MacNish	SM	Updated following ER / HWC Comments
1	13.11.2024	S. Grunsell	SG	A Grant J Nisbet Mattia Tabacchi (Renzo Associates)	AG JN	S MacNish	SM	Updated following DPHI Comments

Distribution List

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Environment Manager	A Grant
Environmental Representative	D Bone

The controlled master version of this document is available for distribution as appropriate and maintained on the document management system being used on the Project, available to all Project workers. All circulated hard copies of this document are deemed to be uncontrolled.

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Terms and Abbreviations

Term/Abbreviation	Definition/Expanded text
ABL	Assessment Background Level – A single-number figure used to characterise the background noise levels from a single day of a noise survey. ABL is derived from the measured noise levels for the day, evening, or night-time period of a single day of background measurements. The ABL is calculated to be the tenth percentile of the background LA90 noise levels, i.e. the measured background noise is above the ABL 90% of the time.
ABN	Airborne noise
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.
AMS	Activity Method Statements
AQMP	Air Quality Management Sub-Plan
Attenuation	The reduction in the level of sound or vibration.
At-property acoustic treatment	Includes courtyard walls and building treatments. Building treatments may include but are not limited to ventilation, acoustic blinds/curtains, glazing, window and door seals, sealing of vents or underfloor areas, shutters and secondary glazing.
AVTG	Assessing Vibration – A Technical Guideline
CS	Communications Strategy
CEMP	Construction Environmental Management Plan
CMP	Construction Monitoring Program
CNVG	Construction Noise and Vibration Guideline (CNVG) (Transport for NSW 2016b)
CoA	Conditions of Approval
Construction	Includes all activities required to construct the SSI as defined in the Project Description described in the documents listed in Condition A1, including commissioning trials of equipment and temporary use of any part of the SSI but excludes Low Impact Work which is carried out or completed prior to approval of the CEMP and works approved under a Site Establishment Management Plan.
Consultation	To provide information and actively engage with and obtain and consider feedback from stakeholders during development of post approval documents. How the feedback has been considered and whether any changes have been made in response to this feedback is then documented and communicated back to stakeholders. Consultation should not be limited to one-way notification about the project.
Continuously	Includes any period during which there is less than one hour between ceasing and recommencing any of the work.
CNVMP	Construction Noise and Vibration Management Plan
D&C	Design and Construct
dB(A)	Decibels using the A-weighted scale which is accepted as being representative of the frequency response of the human ear.
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DECCW	Department of Environment and Climate Change and Water
DPHI	Former Department of Planning, Industry and Environment, now Department of Planning, Health and Infrastructure
EIS	Environmental Impact Statement
EMS	Environmental Management System
Environmental Assessment Documentation	Hunter Water Corporation Belmont Desalination Plant Environmental Impact Statement, prepared by GHD dated 2019. Hunter Water Corporation Belmont Desalination Plant Amendment Report and Submissions Report prepared by GHD dated 2020. Hunter Water Corporation Belmont Desalination Plant Modification Report Environmental Impact Statement prepared by Jacobs dated 2024.

Term/Abbreviation	Definition/Expanded text
	Hunter Water Corporation Belmont Desalination Plant Modification Report – Submissions Report prepared by Jacobs dated 2024
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 incident	An unexpected event that has, or has the potential to, cause harm to the environment and requires some action to minimise the impact or restore the environment.
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	<i>Environmental Planning and Assessment Act 1979</i>
EPA	Environment Protection Authority
EPL	Environment Protection Licence
ER	Environmental Representative
EWMS	Environmental Work Method Statement
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.
GBN	Ground-borne noise
Highly Noise Affected	As defined in the Interim Construction Noise Guideline (DECC, 2009)
Highly noise intensive works/ particularly annoying	Work which is defined as annoying under the ICNG including: use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work (a) grinding metal, concrete or masonry; (b) rock drilling; (c) line drilling; (d) vibratory rolling; (e) bitumen milling or profiling; (f) jackhammering, rock hammering or rock breaking; and (g) impact piling Note: when modelled, these activities/plant and equipment will incur a 5dB(A) penalty.
HWC	Hunter Water Corporation
ICNG	Interim Construction Noise Guideline (DECC, 2009)
INP	Industrial Noise Policy
ISCA	Infrastructure Sustainability Council of Australia
JH	John Holland
L _{A(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.
L _{Aeq(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.
LA1	The A-weighted sound pressure level that is exceeded for 1 per cent of the time for which the given sound is measured.

Term/Abbreviation	Definition/Expanded text
LA90	The A-weighted sound pressure level that is exceeded for 10 per cent of the time for which the given sound is measured.
NCA	Noise Catchment Area
NCG	Noise Criteria Guideline
NMG	Noise Mitigation Guideline
NML	Noise Management Level as defined in the Interim Construction Noise Guideline (DECC, 2009)
NPfI	Noise Policy for Industry
NVA	Noise and Vibration Assessment
NVIS	Noise and Vibration Impact Statement
ONR	Operational Noise Review
OOHW	Out of Hours Works
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
PPV	Peak Particle Velocity – the highest velocity of a particle (such as part of a building structure) as it vibrates. Most sound level meters measure root mean squared (RMS) values; it is common to approximate the PPV based on an RMS measurement. PPV is commonly used as a vibration criterion, and is often interpreted as a PPV based on the L _{max} or L _{max,spec} index.
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).
REMM	Revised Environmental Management Measures
RMS	Root Mean Squared
RNP	Road Noise Policy
ROL	Road Occupancy Licence
Sensitive land use(s)	Includes residences, educational institutions (including preschools, schools, universities, TAFE colleges), health care facilities (including nursing homes, hospitals), religious facilities (including churches), childcare centres, passive recreation areas (including outdoor grounds used for teaching). Receivers that may be considered sensitive include commercial premises (including film and television studios, research facilities, entertainment spaces, temporary accommodation such as caravan parks and camping grounds, restaurants, office premises, and retail spaces), and industrial premises as identified by the Planning Secretary.
Submissions Report	The Proponent's response to issues raised in the submission received in relation to the application for approval of the SSI under the EP&A Act.
SPL	Sound Pressure Level
TfNSW	Transport for New South Wales, or TfNSW
VMS	Variable Message Signs
Work	Any physical activity for the purposes of the SSI including construction, Low Impact Work, enabling works, utility works and site establishment activities but not including operational maintenance works.
WRA	Work Risk Assessment

Noise and Vibration Monitoring Program

Plan Profile

Management System	The Project will use John Holland's Environmental Management System (EMS) and core Project plans to support Project delivery. Additional functional plans have been developed for the Project.
Name	Noise and Vibration Monitoring Program
Authorisation	All personnel employed on the Project will perform their duties in accordance with the requirements of this Plan and in compliance with Project system procedures and any specific Project instructions. This Plan is authorised by the Project Director.
Review and update	This Plan will be regularly reviewed, developed, and updated: • For changes in design or construction sequence, staging, methodology or resourcing • To consider progress of the Project Company's Work • For changes in access to the Project Site and Temporary Areas • To consider changes directed by HWC Representative

1. Introduction

1.1. Context

This Construction Noise and Vibration Monitoring Program (monitoring program) is an appendix of the Construction Noise and Vibration Management Sub Plan (CNVMP) which forms part of the Construction Environmental Management Plan (CEMP) for the Belmont desalination plant (the Project).

This monitoring program has been prepared to address the requirements of the ministers Conditions of Approval (CoA), the measures listed in the Environmental assessment documentation and all applicable legislation.

1.2. Scope of the Monitoring Program

The scope of the monitoring program is to describe how the environmental noise and vibration impacts from construction will be monitored during the delivery of the project. This monitoring program has been prepared under and consistent with the CNVMP, considering the relevant sensitive receivers and construction activities.

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

1.3. Purpose and Objectives

The purpose of this monitoring program is to describe the methodology used for monitoring environmental noise and vibration during construction of the project. The key objective of this monitoring program is to ensure that noise and vibration impacts to sensitive receivers and the local community from construction off the project are minimised.

Section 2.2 and 2.3 of the CNVMP further detail objectives and specific targets for the management of noise and vibration impacts during the delivery of the project in relation to this monitoring program.

1.4. Environmental Management System Overview

The Environmental Management System (EMS) for the project is described in the CEMP. To achieve the intended environmental performance outcomes, JH have established, implemented, maintained and continually improved an EMS in accordance with the requirements of ISO 14001:2015. The JH EMS will be adopted as the guiding environmental management framework for the project.

1.5. Monitoring Program Preparation, Approval and Update

This Monitoring Program has been prepared to satisfy CoA C19(j) and has been prepared by a specialist noise and vibration consultant in accordance with CoA C19(a). This monitoring program will be reviewed by Hunter Water Corporation (HWC) and the Department of Planning, Housing and Infrastructure (DPHI) Environmental Representative (ER) to confirm it is consistent with, and incorporates, all relevant requirements prior to submission to the Planning Secretary for approval.

Construction of the project will not commence until the CNVMP, and this monitoring program are endorsed by the ER and approved by the Planning Secretary.

This monitoring program will be implemented for the duration of construction and for any longer periods set out in this monitoring program or specified by the Planning Secretary, whichever is greater. This monitoring program will be regularly reviewed by the Environmental Manager (or Delegate). If Planning agrees, minor amendments to this monitoring program will be approved by the ER.

Any amendments to the monitoring program will be documented in subsequent revisions of this monitoring program. A copy of the updated monitoring program and changes will be distributed to all relevant stakeholders in accordance with approved document control procedures outlined in the CEMP. Site personnel with responsibilities relevant to noise and vibration monitoring will be informed of any amendments and training provided, where required.

2. Environmental Requirements

2.1. Relevant Legislation, Guidelines and Standards

Table 2-1 lists the principal legislation, regulation, plans, policies, guidelines, specifications, and Australian Standards that apply to noise and vibration monitoring.

Table 2-1: Principal legislation and regulation relevant to noise and vibration

Legislation	• <i>Environmental Planning and Assessment Act 1979</i> • <i>Protection of the Environment Operations Act 1997 (POEO Act)</i> • <i>Protection of the Environment Operations (Noise Control) Regulation 2008.</i>
Standards	• British Standard BS6472-2008, Evaluation of human exposure to vibration in buildings (1-80Hz) • British Standard BS 7385: Part 2-1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground-borne vibration (BSI 1993) • German Standard DIN 4150-3 (2016) Vibration in buildings – Part 3: Effects on structures (DIN2016) • Australian Standard AS 1055: 2018 Acoustics – Description and Measurement of Environmental Noise • International Standard ISO5348:2021 Mechanical vibration and shock – Mechanical mounting of accelerometers. • AS/NZS IEC 61672.3:2019 Electroacoustics - Sound level meters, Part 3: Periodic tests • IEC 60942:2017 Electroacoustics - Sound calibrators • ISO 3744 Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for an essentially free field over a reflecting plane • ISO 3746 Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Survey method using an enveloping measurement surface over a reflecting plane • ISO 6393 Earth-moving machinery – Determination of sound power level – Stationary test conditions • ISO 6395 Earth-moving machinery – Determination of sound power level – Dynamic test conditions • NATA General Accreditation Guidance – General Equipment – Calibration and Checks, General Equipment Table 2018
Guidelines and Specifications	• Interim Construction Noise Guideline (ICNG) (DECC 2009a) • NSW EPA Assessing Vibration – a Technical Guideline (AVTG, 2006 – for human exposure) • NSW Road Noise Policy (RNP) (DECCW 2011) • Noise Policy for Industry (NSW EPA 2017). • NSW EPA Approved methods for measurements and analysis of environmental noise (NSW EPA 2022)

Relevant provisions of the above legislation are explained in the Register of Legal and Other Requirements included in Appendix A of the CEMP.

2.2. Conditions of Approval

The CoA and Revised Environmental Mitigation Measures (REMMS) relevant to this Protocol are listed Table 2-2.

Table 2-2: Condition of Approval and Mitigation Measures relevant to this Monitoring Program

CoA	Condition Requirements	Document Reference
A23	Any condition of this approval that requires the carrying out of monitoring or an environmental audit, whether directly or by way of a plan, strategy or program, is taken to be a condition requiring monitoring or an environmental audit under Division 9.4 of Part 9 of the EP&A Act. This includes conditions in respect of incident notification, reporting and response, non-compliance notification, Site audit report and independent auditing. <i>Note: For the purposes of this condition, as set out in the EP&A Act, "monitoring" is monitoring of the development to provide data on compliance with the approval or on the environmental impact of the development, and an "environmental audit" is a periodic or particular documented evaluation of the development to provide information on compliance with the approval or the environmental management or impact of the development.</i>	CNVMP (Section 8)
A24	At least 48 hours before the commencement of construction until the completion of all works under this approval, or such other time as agreed by the Planning Secretary, the Proponent must: a) make the following information and documents (as they are obtained or approved) publicly available on its website: i. the documents referred to in condition A2 of this approval; ii. all current statutory approvals for the development; iii. all approved strategies, plans and programs required under the conditions of this approval; iv. regular reporting on the environmental performance of the development in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval; v. a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this approval, or any approved plans and programs; vi. a summary of the current stage and progress of the development; vii. contact details to enquire about the development or to make a complaint; viii. a complaints register, updated monthly; ix. audit reports prepared as part of any independent audit of the development and the Proponent's response to the recommendations in any audit report; x. any other matter required by the Planning Secretary; and keep such information up to date, to the satisfaction of the Planning Secretary and publicly available for 12 months after the commencement of operations.	CNVMP (Section 8.5)
C19 (j)	include a program to monitor and report on the impacts and environmental performance of the development and the effectiveness of the implemented management measures in accordance with the requirements of condition C11.	This monitoring program
D12	The development must be constructed to achieve the construction noise management levels detailed in the Interim Construction Noise Guideline (DECC, 2009). All feasible and reasonable noise mitigation measures must be implemented and any activities that could exceed the construction noise management levels must be identified and managed in accordance with the management and mitigation measures identified in the approved Construction Noise and Vibration Management Plan.	CNVMP (Section 7.1)
D14	The Proponent must implement, where practicable and without compromising the safety of construction staff or members of the public, the use of 'quackers' to ensure noise impacts on surrounding noise sensitive receivers are minimised.	CNVMP (Section 7.1)
D16	Vibratory compactors must not be used closer than 30 metres from residential buildings unless vibration monitoring confirms compliance with the vibration criteria specified in condition D15.	Section 4.2

2.3. Revised Environmental Management Measures

The REMMs relevant to this monitoring program are listed in Table 2-3. A cross reference is also included to indicate where the requirement is addressed in this monitoring program or other project management documents.

Table 2-3: REMMs relevant to this Monitoring Program

REMM	Condition Requirements	Document Reference
NV7	<u>Vibration monitoring</u> will be undertaken where equipment is being used within the safe working distances detailed in Table 7-41 of the EIS or when a complaint is received. Vibration monitoring will be conducted during these activities at the most susceptible buildings close to the construction sites. - Any vibration measurement will be undertaken by a qualified professional and with consideration to the ICNG guidelines.	Section 4.2
NV8	Complaints will be managed in accordance with the CEMP and the procedure outlined below. Signage will clearly and visibly provide a contact number and name to receive complaints and enquiries about construction. Potential complaints specific to these works could include: - Vibration impacts from works that significantly affect structures or dwellings - A cluster of noise and/or vibration complaints - Works have the potential to cause noise complaints from nearby receivers. The response will be to: - Verbally respond to complainant - Provide a written response within seven calendar days if the complaint cannot be resolved verbally - Log the complaint, and any actions taken with regards to the complaint within a complaints register - Undertake <u>monitoring</u> at the complainant's residence(s) - Investigate the nature and reasons of the impact and implement further mitigation measures to minimise the impact.	Section 5
MB7	Artificial noise emissions - here activities that generate underwater noise cannot be timed to occur outside of peak migration months the following mitigation measures and controls may be implemented. Where this is not possible, the need for Marine Fauna Observers will be determined on the basis of construction timeframes. - Acoustic harassment/deterrent devices could be sounded prior to commencement of any underwater activity to provide opportunity for sensitive marine fauna to relocate temporarily. - Vessel machinery will be maintained in accordance with the manufacturer specifications to reduce noise emissions. The interaction of all vessels with cetaceans and whale sharks will be compliant with Part 8 of the Environment Protection and Biodiversity Conservation (EPBC) Regulations (2000). The Australian Guidelines for Whale and Dolphin Watching (Commonwealth of Australia, 2017)) for sea-faring activities will be implemented across the entire Project. Including underwater within 300 metres of a cetacean.	CNVMP (Table 7.7)

3. Existing Environment and sensitive receivers

The noise environment within the suburban areas are generally influenced by road traffic from the Pacific Highway particularly during the day-time period. Natural white noise from Tasman Sea and Belmont Bay are also audible during quieter periods when traffic volumes drop. During the evening and night-time periods, ambient noise levels typically decrease due to a reduction in the volume of road traffic.

The existing Belmont Waste Water Treatment Works (WWTW) is located at the northern extent of the project area, suburban residential receivers including Active and passive recreational areas and motels and educational facilities are located to the west of the Project area. The suburban residential areas in Belmont are located to the south west of the Project.

3.1. Baseline Data

A summary of the background noise and vibration levels is provided in Section 4 of the CNVMP. The ambient noise environment is dominated by a combination of road traffic noise in the vicinity of the Pacific Highway at Belmont, local transport activities and natural white noise from South Pacific Ocean and Belmont Bay.

Baseline unattended noise monitoring was conducted in accordance with the procedures in the Noise Policy for Industry (NPI, 2017) guideline at one location. The noise logger was deployed at 24 Beach Street, South Belmont. This location was selected to capture noise characteristics considered representative of the project. Selection considerations included location of sensitive receivers, land topography and contribution from other noise activities, such as road noise. An attended noise measurement was also conducted for a 15-minute duration to identify ambient noise sources and validate unattended logger data. The locations in which the noise monitoring surveys were carried out are shown on Figure 3-1.

Unattended monitoring was carried out between 23 September 2019 and 30 September 2019 at 1 location (LO1). The derived Rating Background Levels (RBL) were re-established in the Modification Report from the levels presented in the EIS. The RBLs are presented in Table 3-1 and have been utilised to determine the Noise Management Levels (NML) applicable to the site component of the completed Construction Noise Assessment.

Table 3-1: Ambient noise monitoring results and derived RBL

ID	Address	RBL, dB (A) ¹			Ambient Noise dB (A)		
		Day	Evening	Night	Day	Evening	Night
L01	24 Beach Street, Belmont	38	37	33	55	50	47

Notes: Day time: 7:00AM to 6:00PM Monday to Saturday; or 8:00AM to 6:00PM on Sundays and Public Holidays. Evening: 6:00PM to 10:00PM. Night time: remaining period (NSW Noise Policy for Industry (EPA, 2017)).

3.2. Noise and Vibration Sensitive Receivers

The noise and vibration assessment in the EIS and submissions report identified and considered potential construction noise and vibration impacts for Nearby suburban and commercial areas.

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.

There are sensitive receivers near the Project area, which may be impacted by noise from the construction works and operation of the proposed plant. The nearby sensitive receivers identified, are categorised as:

- Residential
- Commercial/Retail
- Hotel/Motel (Belmont Executive Apartments, Lakeview Motor Inn, Squid's Ink Motel, Gunyah Hotel)
- Active recreation (Belmont Golf Club, Nine Mile Beach, Belmont South Playground)
- Passive recreation (Belmont Cemetery)
- Education (Creative Kids Preschool)

Sensitive receiver locations are shown on Figure 3-1. Sensitive receivers will be reviewed during each revision of this Plan to determine whether any additional measures are required to minimise potential noise and vibration impacts.



Figure 3-1: Project Locality and Noise Monitoring Location

4. Monitoring procedures

4.1. Noise monitoring

The noise monitoring procedure to be adopted for the Project is provided in Table 4-1.

All noise monitoring will be undertaken in accordance with the ICNG and, where additional guidance is required, the NSW Environment Protection Authority Approved methods for the measurement and analysis of environment noise in NSW (Environment Protection Authority, 2022). Any person measuring and analysing environmental noise must be appropriately qualified and experienced in acoustics to a standard sufficient to enable that person to accurately interpret and apply the advice set out in acoustics standards, guidelines and policies (competent person).

Subject to property owner approval, noise monitoring will be conducted at representative residential and other locations (including at the worst-affected residences) to confirm construction noise levels. The ICNG states that noise levels are to be assessed at the property boundary that is most exposed to construction noise, and at a height of 1.5 metres above ground level. If the property boundary is more than 30 metres from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 metres of the residence. The monitoring location will be selected with regard to this guidance in the ICNG, as well as factors including but not limited to:

- Safety of the competent person undertaking the measurement,
- Security of the noise monitoring equipment,
- The purpose of the noise monitoring (such as investigating a noise complaint occurring at a particular façade of a residence), and
- Other site-specific constraints as they may arise.

Table 4-1: Noise monitoring procedure

Monitoring details	Frequency	Test procedure
Attended OOHW noise monitoring at sensitive receivers during evening, night and other OOH periods (weekends/public holidays)	On the first occasion of activities for which an assessment has been prepared	The testing method includes: • Sound level meter configured for “Fast” time weighting and “A” frequency weighting • Outdoor (free-field) measurements should be undertaken at least 3.5m from any reflecting structure (other than the ground) and at a height of 1.2–1.5m above ground level or the floor of interest if pertinent to a building, unless good acoustic practice means that a different position is more appropriate. • Tests will not be carried out during rain or when the wind speed at the test site exceeds 5 m/s at the monitoring location. • Conditions such as wind velocity, wind direction, temperature, relative humidity and cloud cover will be recorded. These may be obtained from the nearest Bureau of Meteorology monitoring station or on-site weather station/observations • The monitoring period should be sufficient such that the measured noise levels are representative of the noise over a 15-minute period • Selected monitoring periods should vary to cover the range of activities being undertaken, including the worst-case construction scenario • Where there is no requirement specified, you must measure at least the following descriptors: – equivalent A-weighted continuous sound level ($L_{Aeq,T}$) – maximum A-weighted sound pressure level ($L_{AFmax,T}$) – A-weighted sound pressure level that is exceeded for 90% of the measurement time ($L_{AF90,T}$)
Attended monitoring where a complaint is received and monitoring is considered an appropriate response to determine if noise levels exceed predicted ‘worst case’.	Related to noise complaint	

Monitoring details	Frequency	Test procedure
		– A-weighted sound pressure level that is exceeded for 10% of the measurement time ($L_{AF10,T}$). • The attended noise monitoring data will be compared to the relevant NML and/or predicted noise levels. • Observations will also be reported including audibility of construction noise, other noise in the environment and any discernible construction activities contributing to the noise at the receiver. If 'particularly annoying' activities (as listed in the ICNG) are the dominant noise source during the measurement, then the noise from that activity will be increased by 5 dB(A) before comparison to the relevant NML and/or predicted noise levels.
Where required for the purposes of refining construction methods or techniques to reduce noise levels (e.g. noise monitoring as a result of a consistency assessment)	Reviewed monthly following monitoring	• Sound level meter configured for "Fast" time weighting and "A" frequency weighting • The test environment will be free from reflecting objects • Tests will not be carried out during rain or when the wind speed at the test site exceeds 5 m/s at the monitoring location. • Duration will depend on the noise source being monitored. Sources generating continuous noise (e.g. generators) may be measured for 1-2 minutes, dynamic plant (e.g. front-end loaders) will be measured during a representative activity (e.g. a load cycle). • If verifiable data confirming the sound power level of the item is not available, attended measurements shall be conducted before the item is used on-site to verify the sound power level and confirm that the sound power level does not exceed the maximum levels in the assessment. • Where the sound power level of a particular plant/equipment item is believed to have changed since the initial measurement, or is inconsistent with provided data, a subsequent measurement shall be conducted to verify its sound power level.
Real time (unattended) monitoring	ongoing	Refer to Section 4.1.2
Monitoring requested by the EPA	As required	To be determined based on the monitoring request

Where actual noise levels exceed the predicted worst-case levels, the source of excessive noise generation will be identified, and any additional feasible and reasonable measures available will be implemented to either reduce noise emissions or reduce the impacts on receivers.

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

4.1.1. Noise monitoring equipment

All monitoring will be undertaken by competent personnel, suitability trained and experienced in undertaking noise measurements. Noise monitoring equipment used will be at least Class 1 instruments and calibrated in accordance with manufacturer specifications or relevant Australian Standards. The calibration of the monitoring equipment will be checked in the field before the noise measurement period.

Acoustic instrumentation employed in the noise monitoring surveys will carry current manufacturer conformance certificates and comply with the guidelines identified in Section 2.

4.1.2. Real time noise monitoring

Real-time (unattended) noise monitoring will be undertaken to provide useful indications of noise exceedances. Real-time noise monitoring would only be used as a backup for attended noise monitoring and will not be used alone.

Subject to property owner approval, real time noise monitoring will be conducted at one private property location to be determined in consultation with HWC and the ER.

4.2. Vibration monitoring

The vibration monitoring procedure to be adopted for Project is provided in Table 4-2. All vibration monitoring will be undertaken in accordance with the technical guidance as identified below:

- For cosmetic damage to heritage structures (structurally unsound), the German Standard DIN 4150-3: Structural Vibration – effects of vibration on structures
- For cosmetic damage to buildings and/or structures (structurally sound), the British Standard BS 7385-2:1993 – Evaluation and measurement for vibration in buildings – Part 2
- For human exposure, Assessing Vibration: A Technical Guideline
- Specific monitoring requirements from utility asset owners.

Subject to property owner approval, vibration monitoring will be conducted at representative receivers/structures and other relevant locations (including at utility assets if relevant) to confirm construction vibration levels.

Table 4-2: Vibration monitoring procedure

Monitoring details	Frequency	Test procedure
At the commencement of vibratory compaction work within 30 m of residential buildings (CoA D16)	As required	Attended vibration monitoring will be undertaken when checking the minimum working distances from construction plant or in response to a complaint. The testing method includes:
Where a complaint is received in relation to human exposure to vibration levels and monitoring is considered an appropriate response	As required	• Transducer to be affixed to ground or building in general accordance with ISO5348:2021 • The testing will be conducted at each location to obtain a suitable representation of the range of vibration levels that would occur from the tested plant • The plant will be tested in the settings in which it is expected to operate. For vibratory rollers this may include both “High” and “Low” settings • PPV with sufficient temporal resolution to determine vibration impacts and the dominant frequency of the vibration will be recorded for assessment against the cosmetic damage criteria and against human comfort (screening criteria). In situations in which human comfort is the main concern then a metric which is appropriate for estimating the vibration dose values should be considered.
Where an activity may occur within minimum working distances for cosmetic damage	As required	
Where required for the purposes of refining construction methods to reduce vibration levels (e.g. in the case of a consistency assessment)	As required	
Where an activity may occur within minimum working distances for cosmetic damage (for Belmont WWTW structures)	As required	Continuous vibration monitoring will be undertaken in situations where there is a high risk that vibration from a particular construction activity may exceed the cosmetic damage criteria at a sensitive structure. This will be where activities may occur within the site specific minimum working distances for cosmetic damage. The testing method includes: • Transducer to be affixed to ground or building in general accordance with ISO5348:2021 • Vibration logger to continuously measure vibration levels while the relevant works are occurring within the site-specific minimum working distance for cosmetic damage • Measurement to be conducted as close as possible to the sensitive structure • A warning system will be implemented with the monitoring system (e.g. SMS and/or email alerts to site personnel)

Monitoring details	Frequency	Test procedure
		PPV with sufficient temporal resolution to determine vibration impacts and the dominant frequency of the vibration will be recorded for assessment against the cosmetic damage criteria.
Vibration testing for vibration generating activities that have the potential to impact on heritage items	As required	Identify minimum working distances to prevent cosmetic damage. When conducting monitoring on a heritage item, the advice of a suitably qualified and experienced heritage specialist will be obtained and implemented to ensure the monitoring installation does not have an adverse impact on the heritage significance of the item.
Monitoring requested by the EPA	As required	To be determined based on the monitoring request

Where vibration is found to exceed the relevant vibration criteria, impacts will be reduced by changing work methods and/or equipment. Details of site activity and equipment usage will be noted during monitoring.

4.2.1. Minimum working distances

The minimum working distances presented in Section 7.2 of the CNVMP are indicative and will vary depending on the item of plant (particularly its power rating), local geotechnical conditions and the dominant frequency of the construction vibration levels. The cosmetic damage thresholds apply to typical light-framed residential buildings and heritage buildings and assume that construction vibration could include low frequency content with associated increased risk of cosmetic damage.

4.2.2. Vibration monitoring equipment

John Holland will identify the vibration monitoring equipment to be used and a relevant maintenance/ calibration program with respect to the manufacturer's specifications and relevant standards. Monitoring methods and instrumentation employed in the vibration monitoring surveys will comply with the relevant vibration measurement requirements in the reference standards and documents in Section 2.1.

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

4.3. Monitoring in response to complaints

John Holland will offer attended noise or vibration monitoring to noise complainants at their premises if:

- Any investigation referred to in this condition identifies works or activities as the likely source of the complaint, and
- JH is not in possession of noise monitoring data representative of the complainant's location and of the subject works and activities being undertaken on the site.

John Holland will, in respect of each complaint made, advise each complainant of the results of its investigation of their complaint and any proposed reasonable and relevant remedial action within a reasonable period of time.

4.4. Noise and vibration monitoring locations

Noise and vibration monitoring locations may vary throughout construction of the Project. Final monitoring locations will be determined on a case-by-case basis in a noise and vibration assessment.

Noise monitoring locations will include representative sensitive receivers relevant to the Project.

Vibration monitoring will be undertaken at vibration sensitive locations within the 'minimum working distances'.

Attended noise and vibration monitoring locations will include locations identified as a result of a noise complaint or known noise related incident.

5. Compliance Management

5.1. Roles, Responsibility and Training

The organisational structure for the project and overall roles and responsibilities are outlined in the CEMP. Specific responsibilities for the implementation of environmental controls for noise and vibration are detailed in the CNVMP.

Personnel working on site will undergo a site induction and targeted training relating to noise and vibration management issues, as detailed in the CNVMP. All personnel involved in the implementation of this monitoring programme will receive training in the correct use of equipment, including field maintenance, use, storage and data analysis. The environmental manager (or delegate) is responsible for training and keeping records of trained staff.

5.2. Data analysis

Noise and vibration monitoring results obtained during the monitoring programme will be compared against the performance criteria described in Section 5 of the CNVMP and/or predicted levels. The results will be tabulated in a monitoring spreadsheet and provided as part of the reporting requirements detailed in Section 5.4. below.

5.3. Management of Exceedances

In the event that exceedances are identified during monitoring, the Environment Manager (or Delegate) will coordinate a management review and the appropriate responses that are triggered. The review will include:

- Investigation of the construction activities occurring at the time, including specific equipment, plant and vehicles in comparison to that assessed as part of the noise and vibration assessment and/or relevant approvals.
- Identification of other (non-project) activities that may influence monitoring results (unrelated works or events such as meteorological conditions etc).
- Identification of the possible causes for the exceedance.
- Effectiveness of mitigation measures (Section 7 of the CNVMP) already in place at the time of the exceedance.
- Identification of additional reasonable and feasible mitigation measures.
- Inclusion of learnings from the above into the noise and vibration modelling process for fine-tuning.

The EIS and subsequent modification outlines noise and vibration goals for this project. An exceedance of those goals may not be a non-compliance, if, when investigated, finds that the Project has implemented the management process within this section (Section 5.3), all environmental control measures in section 7.1 of the Noise and Vibration Management Plan and all other reasonable and feasible mitigation measures.

Section 4.10 of the CEMP defines non-compliance and non-conformance and their associated reporting requirements. Generally, a non-compliance refers to a breach of the CoA or a failure to implement the CEMP and CEMP sub-plans, requiring a notification to the Planning Secretary, while a non-conformance is a failure to comply with standards and procedure established by the Project EMS in addition to the CoA.

Mitigation measures and preventative/corrective actions will be developed in accordance with the environmental management measures outlined in the CEMP. The Environmental Manager (or delegate) will verify and document the effectiveness of any management measures or preventative/corrective actions implemented to avoid further exceedances. The timing for any improvement in relation to a non-compliance (or non-conformance where appropriate) will be agreed in consultation with HWC based on the level of risk or re occurrence of the exceedance (e.g. A significant risk will require immediate action).

5.4. Reporting

All monitoring results are to be provided to HWC, the ER, DPHI upon request. Reporting requirements relevant to the management of noise and vibration are identified in Table 5-1:

Table 5-1: Reporting requirements specific to noise and vibration management

Item	Frequency	Standards	External Reporting	Responsibility
Non conformance	At each occurrence	Environmental Incident Classification and Reporting Procedure.	Depending on nature of non-conformance; ER and HWC in monthly reports or audit reports	Project Environment Manager (or delegate)
Incident and non-compliance reports	At each occurrence	Reporting of incidents and non-compliances in accordance with CoA, EPL (and associated PIRMP), Environmental Incident Classification and Reporting Procedure.	Appropriate authority dependant on nature of the incident (e.g. EPA, DPHI) HWC	Project Environment Manager (or delegate) / HWC in accordance with the CEMP
Complaint register	Daily (ER, EPA) as received DPHI as requested	Reporting of complaints, in accordance with the CoA, EPL and CCS, through the complaints register, to the ER and EPA for any complaints received (on the day they are received). Communication, notification and complaints handling requirements regarding Noise matters will be managed through the Complaints Management System and the CCS.	ER EPA (in accordance with EPL conditions) DPHI (as requested by the Secretary) HWC	Project Environment Manager (or delegate)
Weekly environmental inspection	Weekly	Inspection of the environmental controls and implementation all relevant mitigation measures relating to noise and vibration.	N/A	Project Environment Manager (or delegate)
Noise Monitoring Report	Monthly	Noise monitoring results	ER / HWC	Project Environment Manager (or delegate)

6. Review and Improvement

6.1. Continuous Improvement

Continuous improvement of the Construction Noise and Vibration Monitoring Program will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

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

The Environment Manager (or delegate) is responsible for ensuring stage-specific environmental risks are identified and included in the Project risk register and appropriate mitigation measures implemented throughout the construction, as part of the continuous improvement process. The process for ongoing risk identification and management during construction is outlined in the CEMP.

6.2. Monitoring Program Update and Amendment

The processes described in the CEMP may result in the need to update or revise this monitoring program. Only the Environment Manager (or delegate) has the authority to approve changes to the requirements of this Plan. Minor amendments to the program may be approved by the ER in accordance with the CEMP and are to be implemented for the duration of construction and for any longer period set out in the monitoring programs or specified by the Planning Secretary, whichever is the greater. Amendments not considered minor by the ER need to be approved by the Planning Secretary.

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

Appendix B – Out of Hours Work Protocol

Refer to CS1135-WT-BEL-EN-PLN-0004 Out-of-Hours-Work Protocol

Belmont Desalination Plant

Out-of-Hours-Work Protocol

Document Number: CS1135-WT-BEL-EN-PLN-0004

Revision Number: 1

Issue Date: 13/11/2024

Revisions and Distribution

Revisions

Draft issues of this document are identified as Revision A, B, C, etc. Upon initial issue (generally Contract Award) this will be changed to a sequential number commencing at Revision 0. Revision numbers will continue at Revision 1, 2, etc.

Rev	Date	Prepared By [Name]	[Signature]	Reviewed By [Name]	[Signature]	Approved By [Name]	[Signature]	Remarks
A	15/04/24	SG	SG	AG	AG	AG	AG	Issue to HWC as draft
B	12/08/24	S Grunsell	SG	A Grant J Nisbet	AG JN	S MacNish	SM	Update post modification
0	23/09/24	S Grunsell	SG	A Grant J Nisbet	AG JN	S MacNish	SM	Update post HWC / ER Review
1	13/11/24	B Rice	BR	A Grant J Nisbet Mattia Tabacchi (Renzo Associates)	AG JN MT	S MacNish	SM	Updated to DPHI comments

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The controlled master version of this document is available for distribution as appropriate and maintained on the document management system being used on the Project, available to all Project workers. All circulated hard copies of this document are deemed to be uncontrolled.

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Terms and Abbreviations

Term/Abbreviation	Definition/Expanded text
ABL	Assessment Background Level – A single-number figure used to characterise the background noise levels from a single day of a noise survey. ABL is derived from the measured noise levels for the day, evening, or night-time period of a single day of background measurements. The ABL is calculated to be the tenth percentile of the background LA90 noise levels, i.e. the measured background noise is above the ABL 90% of the time.
ABN	Airborne noise
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.
AMS	Activity Method Statements
AQMP	Air Quality Management Sub-Plan
Attenuation	The reduction in the level of sound or vibration.
At-property acoustic treatment	Includes courtyard walls and building treatments. Building treatments may include but are not limited to ventilation, acoustic blinds/curtains, glazing, window and door seals, sealing of vents or underfloor areas, shutters and secondary glazing.
AVTG	Assessing Vibration – A Technical Guideline
CS	Communications Strategy
CEMP	Construction Environmental Management Plan
CMP	Construction Monitoring Program
CNVG	Construction Noise and Vibration Guideline (CNVG) (Transport for NSW 2023)
CoA	Conditions of Approval
Construction	All physical work to enable operation including (unless specifically excluded by a condition) but not limited to the carrying out of works for the purposes of the development, including bulk earthworks and erection of buildings and other infrastructure permitted by this approval, but excluding the following: • building and road dilapidation surveys; • investigative drilling or investigative excavation; • Archaeological Salvage; • establishing temporary site offices (in locations identified by the conditions of this approval); • installation of environmental impact mitigation measures, fencing, enabling works; and • minor adjustments to services or utilities However, where heritage items, or threatened species or threatened ecological communities (within the meaning of the Biodiversity Conservation Act 2016 or Environment Protection and Biodiversity Conservation Act 1999) are affected or potentially affected by any physical work, that work is construction, unless otherwise determined by the Planning Secretary in consultation with EES Group or DPIE Fisheries (in the case of impact upon fish, aquatic invertebrates or marine vegetation).
Consultation	To provide information and actively engage with and obtain and consider feedback from stakeholders during development of post approval documents. How the feedback has been considered and whether any changes have been made in response to this feedback is then documented and communicated back to stakeholders. Consultation should not be limited to one-way notification about the project.
Continuously	Includes any period during which there is less than one hour between ceasing and recommencing any of the work.
D&C	Design and Construct
dB(A)	Decibels using the A-weighted scale which is accepted as being representative of the frequency response of the human ear.
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DECCW	Department of Environment and Climate Change and Water
DCCEEW	Department of Climate Change, Energy, the Environment and Water

Term/Abbreviation	Definition/Expanded text
DPHI	Former Department of Planning, Industry and Environment, now Department of Planning, Health and Infrastructure
EIS	Environmental Impact Statement
EMS	Environmental Management System
Environmental Assessment Documentation	Hunter Water Corporation Belmont Desalination Plant Environmental Impact Statement, prepared by GHD dated 2019. Hunter Water Corporation Belmont Desalination Plant Amendment Report and Submissions Report prepared by GHD dated 2020. Hunter Water Corporation Belmont Desalination Plant Modification Report Environmental Impact Statement prepared by Jacobs dated 2024. Hunter Water Corporation Belmont Desalination Plant Modification Report – Submissions Report prepared by Jacobs dated 2024
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 incident	An unexpected event that has, or has the potential to, cause harm to the environment and requires some action to minimise the impact or restore the environment.
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	<i>Environmental Planning and Assessment Act 1979</i>
EPA	Environment Protection Authority
EPL	Environment Protection Licence
ER	Environmental Representative
EWMS	Environmental Work Method Statement
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.
GBN	Ground-borne noise
Highly Noise Affected	As defined in the Interim Construction Noise Guideline (DECC, 2009)
Highly noise intensive works/ particularly annoying	Work which is defined as annoying under the ICNG including: use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work (a) grinding metal, concrete or masonry; (b) rock drilling; (c) line drilling; (d) vibratory rolling; (e) bitumen milling or profiling; (f) jackhammering, rock hammering or rock breaking; and (g) impact piling Note: when modelled, these activities/plant and equipment will incur a 5dB(A) penalty.
HWC	Hunter Water Corporation
ICNG	Interim Construction Noise Guideline (DECC, 2009)
INP	Industrial Noise Policy
ISCA	Infrastructure Sustainability Council of Australia

Term/Abbreviation	Definition/Expanded text
JH	John Holland
L _{A(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.
L _{Aeq(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.
LA1	The A-weighted sound pressure level that is exceeded for 1 per cent of the time for which the given sound is measured.
LA90	The A-weighted sound pressure level that is exceeded for 10 per cent of the time for which the given sound is measured.
NCA	Noise Catchment Area
NCG	Noise Criteria Guideline
NMG	Noise Mitigation Guideline
NML	Noise Management Level as defined in the Interim Construction Noise Guideline (DECC, 2009)
NPfI	Noise Policy for Industry
NVA	Noise and Vibration Assessment
NVIS	Noise and Vibration Impact Statement
NVMP	Noise and Vibration Management Sub-Plan
ONR	Operational Noise Review
OOHW	Out of Hours Works
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
PPV	Peak Particle Velocity – the highest velocity of a particle (such as part of a building structure) as it vibrates. Most sound level meters measure root mean squared (RMS) values; it is common to approximate the PPV based on an RMS measurement. PPV is commonly used as a vibration criterion, and is often interpreted as a PPV based on the L _{max} or L _{max,spec} index.
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).
REMM	Revised Environmental Management Measures
RMS	Root Mean Squared
RNP	Road Noise Policy
ROL	Road Occupancy Licence
Sensitive land use(s)	Includes residences, educational institutions (including preschools, schools, universities, TAFE colleges), health care facilities (including nursing homes, hospitals), religious facilities (including churches), childcare centres, passive recreation areas (including outdoor grounds used for teaching). Receivers that may be considered sensitive include commercial premises (including film and television studios, research facilities, entertainment spaces, temporary accommodation such as caravan parks and camping grounds, restaurants, office premises, and retail spaces), and industrial premises as identified by the Planning Secretary.
Submissions Report	The Proponent's response to issues raised in the submission received in relation to the application for approval of the SSI under the EP&A Act.
SPL	Sound Pressure Level
Transport	Transport for New South Wales, or TfNSW
VMS	Variable Message Signs
Work	Any physical activity for the purposes of the SSI including construction, Low Impact Work, enabling works, utility works and site establishment activities but not including operational maintenance works.
WRA	Work Risk Assessment

Out of Hours Work Protocol

Plan Profile

Management System	The Project will use John Holland's Environmental Management System (EMS) and core Project plans to support Project delivery. Additional functional plans have been developed for the Project.
Name	Out of Hours Work Protocol (OOHWP)
Authorisation	All personnel employed on the Project will perform their duties in accordance with the requirements of this Plan and in compliance with Project system procedures and any specific Project instructions. This Plan is authorised by the Project Director.
Review and update	This Plan will be regularly reviewed, developed, and updated: • For changes in design or construction sequence, staging, methodology or resourcing • To consider progress of the Project Company's Work • For changes in access to the Project Site • To consider changes directed by Hunter Water Corporation's Representative

1. Introduction

1.1. Context

This Out of Hours Work Protocol (OOHWP) forms part of the Construction Noise and Vibration Management Sub-Plan (CNVMP) or the Belmont Desalination Plant (the Project). The OOHWP has been developed to address the requirements of the Conditions of Approval (CoA), the measures listed in the Environmental Assessment Documentation.

The Environmental Assessment Documentation identifies the potential impacts from noise and vibration during construction typically associated with increased traffic during peak hour periods, increased noise impacts for certain construction stages, inclusion of some Out of Hours Work (OOHW), and the addition of helicopter traffic. However, it concluded residual risks from construction activities can be reduced to the extent that potential impacts could be managed. A detailed Project description is provided in the CEMP.

1.2. Purpose and Scope of this Protocol

The Out of Hours Work Protocol is developed to identify a process for the consideration, management and approval of Work, which is outside the hours defined in CoA Condition D3. In accordance with CoA Condition C29, the Protocol does not apply if the requirements of Condition D4(a) or D4(b) or D4(d) are met, or if the Construction activity(ies) is subject to an EPL or if a negotiated agreement is made with the impacted sensitive receivers.

This protocol has been developed to provide a process for the approval of OOHW in accordance with CoA D4(c)(ii) including:

- Justification of why construction works are required
- Identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination
- 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 impacted sensitive receivers at each affected location
- Details of respite periods consistent with the requirements developed in consultation with impacted sensitive receivers
- Procedures to facilitate the coordination of out-of-hours works to ensure appropriate respite is provided
- Notification arrangements for affected receivers for approved out-of-hours work and notification to the Planning Secretary of approved low risk out-of-hours works.

1.3. Protocol Preparation, Endorsement and Approval

The OOHWP has been prepared to satisfy the CoA C29.

The overarching CNVMP, which includes this OOHWP has been prepared by suitably qualified and experienced noise expert (Renzo Tonin & Associates) in accordance with CoA C19(a). These documents will be reviewed by the HWC Environmental representative (or delegate) and the independent Environmental Representative (ER) to confirm they are consistent with, and incorporate, all relevant elements of the CEMP, prior to submission to the Planning Secretary for approval.

Construction of the Project will not commence until the OOHWP is endorsed by the ER and approved by the Planning Secretary.

2. Environmental Requirements

2.1. Relevant Legislation, Guidelines and Standards

Table 2-1 lists the principal legislation, regulation, plans, policies, guidelines, specifications, and Australian Standards that apply to noise and vibration management.

Table 2-1: Principal legislation and regulation relevant to noise and vibration

Legislation	• <i>Environmental Planning and Assessment Act 1979</i> • <i>Protection of the Environment Operations Act 1997 (POEO Act)</i> • <i>Protection of the Environment Operations (Noise Control) Regulation 2008.</i>
Standards	• British Standard BS6472-2008, Evaluation of human exposure to vibration in buildings (1-80Hz) • British Standard BS 7385: Part 2-1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground-borne vibration (BSI 1993) • German Standard DIN 4150-3 (2016) Vibration in buildings – Part 3: Effects on structures (DIN2016) • Australian Standard AS2436:2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites • Australian Standard AS/NZS 2107:2016 Acoustics - Recommended design sound levels and reverberation times for building interiors • Australian Standard AS/NZS ISO 3100:2009 Risk Management – Principals and Guidelines
Guidelines and Specifications	• Interim Construction Noise Guideline (ICNG) (DECC 2009a) • NSW EPA Assessing Vibration – a Technical Guideline (AVTG, 2006 – for human exposure) • NSW Road Noise Policy (RNP) (DECCW 2011) • Noise Policy for Industry (NSW EPA 2017). • NSW EPA Approved methods for measurements and analysis of environmental noise (NSW EPA 2022)

Relevant provisions of the above legislation are explained in the Register of Legal and Other Requirements included in Appendix A of the CEMP.

2.2. Conditions of Approval and Mitigation Measures

The CoA and Revised Environmental Mitigation Measures (REMMS) relevant to this Protocol are listed Table 2-2.

Table 2-2: Condition of Approval and Mitigation Measures relevant to the OOHWP

Ref	Condition Requirements	Document Reference
C29	Out-Of-Hours Work Protocol – Works Not Subject to an EPL Prior to the commencement of construction an Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of construction which is outside the hours defined in Condition D3. The Protocol must be prepared in consultation with the ER, and must provide:	This Protocol
	a) justification for why these Construction activities need to be undertaken;	Section 3.2
	b) identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where: i. the ER review all proposed out-of-hours activities and confirm their risk levels, ii. low risk activities can be approved by the ER, and iii. high risk activities that are approved by the Planning Secretary. The risk assessment(s) must be based on a risk assessment carried out in accordance with AS/NZS ISO 31000:2018 "Risk Management";	Section 3.1
	c) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria;	Section 4.3
	d) a process for selecting and implementing mitigation measures for residual impacts in consultation with impacted sensitive receivers at each affected location. The measures must take into account the predicted noise levels (based off worst case work scenarios and where mitigation measures will be implemented) and the likely frequency and duration of the out-of-hours works that sensitive receivers would be exposed to, including the number of noise awakening events;	Section 5
	e) details of respite periods consistent with the requirements developed in consultation with impacted sensitive receivers;	Section 6.1
	f) procedures to facilitate the coordination of out-of-hours work including those approved by an EPL or undertaken by a third party, to ensure appropriate respite is provided; and	Section 6.1
	g) notification arrangements in accordance with Condition B2(f) and notification to the Planning Secretary of approved low risk out-of-hours works.	Section 6.2

Notes:

- The Protocol must be submitted to and approved by the Planning Secretary before the commencement of out-of-hours work. The approved Protocol must be implemented for the duration of Construction. The Planning Secretary may revoke the Out-of-Hours Work approval subject to ongoing community complaints.
- The Protocol does not apply if the requirements of Condition D4(a) or (b) or (d) are met, or if the Construction activity(ies) is subject to an EPL or if a negotiated agreement is made with the impacted sensitive receivers.
- If Construction is regulated by the EPA via an EPL, the management of the activity or Construction must not be co-regulated under the Protocol. The Protocol process must only be used if the Construction activity is not covered by an EPL, including in circumstances where the activity or Construction did not commence under an EPL.
- If the Construction activity(ies) is subject to an EPL and the EPA does not endorse extended hours as part of the EPL, the extended hours cannot be considered under this Protocol.
- Any Planning Secretary approval for Out-of-Hours Work may be subject to trial requirements.
- The intent of the protocol is to provide an assessment framework for short term intermittent activities undertaken out of hours. These activities should be consistent with those identified in the documents listed in Condition A2. Any long term out-of-hours-work not assessed in the documents listed in Condition A2 may need a future Modification approval. The use of the terms short / long term should be considered on a case-by-case basis and be relative to the duration of construction of the SSI.

3. Out-of-Hours-Work process

3.1. OOHW management procedure

Figure 3-1 illustrates the step-by-step process for the management of out of hours works. In accordance with CoA Condition C29, JH will complete risk assessment(s) associated with OOHW out in accordance with AS/NZS ISO 31000:2018 "Risk Management".

OUT OF HOURS WORKS MANAGEMENT PROCEDURE

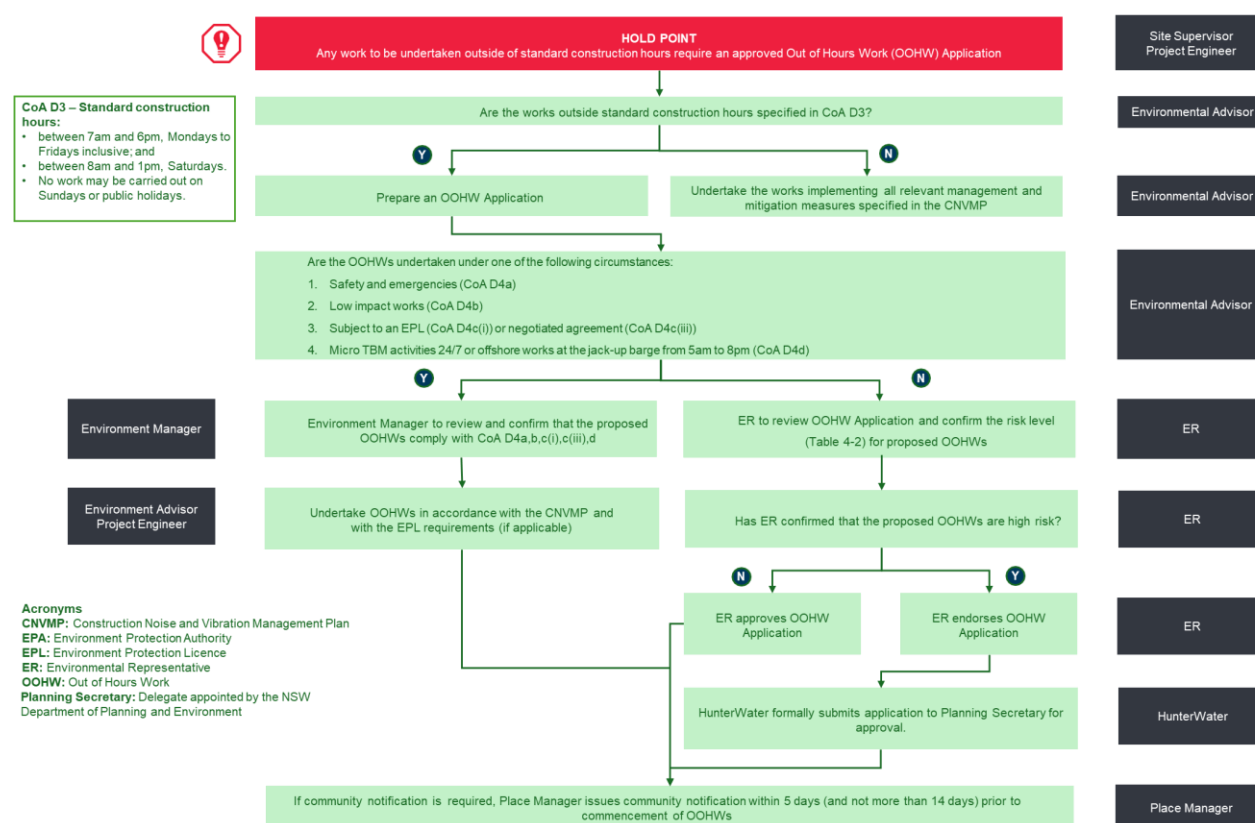


Figure 3-1: Approved construction work hours

3.2. Application of Approval Conditions and Justification of OOHW

3.2.1. Working Hours

Construction working hours for the Project are defined by the CoA are presented below in Table 3-1. Indicative works to be undertaken outside standard construction hours is presented in Table 3-2.

Table 3-1: Approved construction work hours

CoA	Construction Activity	Working hours applicable to Condition		
		Monday to Friday	Saturday	Sunday/ Public holiday
Standard construction hours				
D3	Construction, including the delivery of materials to and from the site, may only be carried out between the following hours:	7:00am to 6:00pm	8:00am to 1:00pm	No work
D41	Helicopter operations associated with the project (inclusive of ground engine runs, starting and taxiing and flight) can only occur from 6am to 7pm, seven days per week. ¹	6:00am to 7:00pm	6:00am to 7:00pm	6:00am to 7:00pm
High Noise Intensive Work				
D7	Except as permitted by an EPL, highly noise intensive works that result in an exceedance of the noise affected NML at the same receiver must only be undertaken a) between the hours of 8:00 am to 6:00 pm Monday to Friday; b) between the hours of 8:00 am to 1:00 pm Saturday; and c) if continuously (any period during which there is less than one hour between ceasing and recommencing any highly noise intensive work), then not exceeding three (3) hours), with a minimum cessation of highly noise intensive work of not less than one hour. ²	8:00am to 6:00pm	8:00am to 1:00pm	No Work
Out of hours Work (OOH)				
D4	Notwithstanding Conditions D3 and D7 Construction may be undertaken outside the hours specified in the following circumstances (a, b, c or d below): (a) 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. On becoming aware of the need for emergency work in accordance with	Outside hours in Condition D3 and D7		

CoA	Construction Activity	Working hours applicable to Condition		
		Monday to Friday	Saturday	Sunday/ Public holiday
	Condition D4(a)(ii), the ER, the Planning Secretary and the EPA must be notified of the reasons for such work. Best endeavours must be used to notify all noise and/or vibration affected residents and owners/occupiers of properties identified sensitive receivers of the likely impact and duration of those Construction activity(ies). If an activity is scheduled to take a long period to be completed, this activity should be commenced as early as possible and aim to be started and completed within the Construction hours identified in Condition D3. Poor programming should not form part of the rational to undertake safety and emergencies under Condition D4(a)(ii). It is essential to prioritise timely completion of activities to ensure the safety and well-being of workers and anyone else who may be affected by the construction activities. (b) Construction that meets the following criteria, including: i. Construction that causes LAeq(15 minute) noise levels: - o no more than 5 dB(A) above the rating background level at any residence in accordance with the Interim Construction Noise Guideline (DECC, 2009), and - o no more than the 'Noise affected' NMLs specified in Table 3 of the Interim Construction Noise Guideline (DECC, 2009) at other sensitive receivers; and ii. Construction that causes LAFmax noise levels no greater than 15 dB(A) above the night period rating background level at any residence during the night period as defined in the Interim Construction Noise Guideline (DECC, 2009); and iii. Construction that causes:			

CoA	Construction Activity	Working hours applicable to Condition		
		Monday to Friday	Saturday	Sunday/ Public holiday
	○ continuous or impulsive vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), and ○ intermittent vibration values measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006). (c) By Approval, including³: i. where different hours are permitted or required under an EPL in force in respect of the SSI; or ii. Construction which is not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by Condition C29; or iii. negotiated agreement with the substantial majority of affected residents and sensitive receivers for Construction which is not subject to an EPL. (d) By Activity, including⁴: i. MicroTBM activities at site can occur 24 hours a day, seven days a week. This does not permit material deliveries associated with MicroTBM activities. ii. Helicopter movements in accordance with Condition D41 and D42. iii. (Offshore works at the jack-up barge from 5:00am to 8:00pm seven days per week.			

CoA	Construction Activity	Working hours applicable to Condition		
		Monday to Friday	Saturday	Sunday/ Public holiday
OOHW Period				
	Required OOHW construction activities include, not associated with MicroTBM activities: - Dewatering - Crane Operations - Vehicle Movements - Commissioning	7:00pm to 7:00am	1:00pm to Monday 7:00am	N/A
	Micro TBM and associated activities for the DOI pipeline	24/7	24/7	24/7

Notes:

1 This Condition does not prohibit any flights required for emergency purposes.

2 As a guide, Work should be carried out in continuous blocks that do not exceed three hours each with a minimum respite period of one hour between each block. Noise affected NML is defined as RBL + 10 dB as defined in the ICNG. If continuously (any period during which there is less than one hour between ceasing and recommencing any highly noise intensive work), then not exceeding three (3) hours), with a minimum cessation of highly noise intensive work of not less than one hour.

3 Refer to Appendix 4 of the CoA for guidance regarding negotiated agreements.

4 Although certain activities identified in Condition D4(d) are permitted to occur outside the construction hours defined in Condition D3, these activities still need to be managed in accordance with the environmental management framework established within this approval.

5 Twenty-four hour seven days per week (24/7) construction associated with the micro-TBM activities for the DOI marine intake pipeline.

Table 3-2: Indicative OOHW requirements

Construction Activity	Out of Hours Work
Tunnelling	Twenty-four hour seven days per week (24/7) construction associated with the micro-TBM activities for the DOI marine intake pipeline
Dewatering	Additional OOHW dewatering of deeper excavations associated with the option of an underground brine pipeline and other works
Crane Operations	Some short duration OOHW associated with some crane lifts (in the early morning) to avoid windy weather periods
Vehicle Movements	A small amount of light and heavy vehicle OOHW
Commissioning	Some short term OOHW during cut-over and commissioning activities.

3.2.2. Justification

Works associated with the Project will be undertaken in accordance with the assessment and management approach outlined in the Interim Construction Noise Guidelines (ICNG) DECC, 2009) and within the limitations of the CoA. The ICNG recommends standard construction hours and requires that OOHW has a strong justification. Where it is considered possible for works to be undertaken during standard hours, OOHW proposals will not be considered justified and will not be considered further. Works that have no justification to occur outside standard construction hours would be undertaken during standard construction hours.

Reasonable justification for work to be undertaken out of hours include, but are not limited to the following:

- Carrying out of those works and activities during standard construction hours would result in a high risk to construction personnel or public safety.

- Following directions by Traffic Management Centre and/or relevant roads authority (e.g. where a road occupancy licence will not be provided for standard construction hours, In order to minimise disruption to the existing road network and the network level of service (LoS).
- Minimising disruption to essential services and utilities for surrounding businesses and adjoining residential receivers.
- Where a utility service operator has advised that the works undertaken during standard hours will result in a high risk to the operation or integrity of the network.
- To undertake critical works that have a demonstrated technical or critical justification that the works need to be undertaken outside of standard hours.

Work activities that may be required or proposed to be undertaken outside of standard working hours will be assessed in accordance with the process outlined in this OOWH Protocol, if the requirements of Condition D4(a) or D4(b) or D4(d) are not met, or if the Construction activity(ies) is not subject to an EPL or if a negotiated agreement has not been made with the impacted sensitive receivers.

4. Out-of-Hours-Work Noise and Vibration Assessment

4.1. OOHW Permit

Works which has been appropriately justified can only proceed outside of standard working hours where a comprehensive OOHW application has been prepared and approved in accordance with the approval pathway outlined in Section 3.1. Appendix A of this OOHW Protocol provides the application template to capture all necessary information for this process including:

- Relevant personnel details.
- Detailed work description including location, activity, equipment required, duration etc.
- Reasonable justification.
- Noise and vibration assessment against relevant noise and vibration objectives
- Determination of an activity risk category (Low and High), if applicable
- Standard mitigation measures to be adopted.
- Details of community consultation including relevant feedback and how it has been addressed, and the status of any agreements.

This information will be reviewed by the relevant approval delegate when considering whether proposed OOHW can proceed as documented, proceed on a conditional basis, or not proceed at all.

The subsequent sections provide further detail of the above (where relevant) or cross-reference to where further detail can be found.

4.2. Noise and vibration objectives

Noise and vibration objectives are described in Section 5 of the CNVMP.

4.3. Noise and Vibration Assessment

4.3.1. Noise Assessment

A noise assessment to determine the noise impacts of the proposed OOHW will be undertaken for each activity, including individual work locations and the impacted areas. The assessment will predict the level and extent of noise impact that OOHW activities will have on potentially affected sensitive receivers under a worst-case scenario.

Quantitative noise assessments for all applicable OOHW will predict the potential exceedances of the OOHW scenario against the relevant NMLs and sleep disturbance screening criteria from the on-site activities. The assessment of the proposed on-site activities will include:

- Details of the nature and scope of each activity, including details of times, duration, plant and equipment to be used on site.
- An evaluation of the realistic worst-case scenario including:
 - the addresses of the most affected noise sensitive receivers
 - construction noise: compare the predicted $L_{Aeq,15\text{ min}}$ noise levels, incorporating any 5 dB correction for particularly annoying activities as listed in the ICNG, against the relevant Noise Management Levels (NML)
 - sleep disturbance: compare the predicted L_{Amax} noise levels against the sleep disturbance screening criteria and awakening reaction level
- Reasonable and feasible mitigation measures to be applied.

4.3.2. Vibration Assessment

An assessment of vibration intensive activities that may impact sensitive receivers or structures will be required for out of hours vibration intensive works. The proposed OOHV activities will be assessed for compliance with minimum working distances for cosmetic damage and human comfort.

Assessments will be undertaken in accordance with Section 7.2 of the CNVMP noting that the minimum working distances provided in this section of the CNVMP are indicative and actual vibration levels will vary depending on the item of plant (particularly its power rating) and local geotechnical conditions. These factors will be considered in the assessment of all vibration generating OOHV.

Where a particular piece of plant or equipment is not included in Section 7.2 of the CNVMP, minimum working distances from a noise and vibration consultant may be used upon ER review.

Prior to undertaking an assessment, all other feasible and reasonable options to use less vibration intensive equipment will be investigated and applied as necessary.

4.4. OOHV Risk Determination and Approval for an OOHV protocol

4.4.1. OOHV protocol approval

The approval process for an OOHV protocol will be determined on a risk-based, case-by-case basis to ensure that OOHV is approved by the appropriate delegate. Justified OOHV will be approved as per Table 4-1 in accordance with CoA D9(a).

Table 4-1: OOHV Approval Delegate

Approval Delegate	OOHV Risk Category
Environmental Representative	Justified OOHV where the ER has confirmed the OOHV is low risk.
NSW Planning Secretary	Justified OOHV where the ER has confirmed the OOHV is high risk.

4.4.2. OOHV Risk Determination

The risk factors in determining low and high risk are outlined in Table 4-2.

Table 4-2: OOHV Risk Factors

Type	Low Risk Factors	High Risk Factors
Air-borne Noise L _{Aeq15min}	Noise levels from on-site activities are predicted to be up to 5dBA above the NML, or Noise levels are predicted to be more than 5dBA above the NML for a maximum of: 2 consecutive evenings and/or nights per week; and 3 non-consecutive evenings and/or nights per week; and 10 evenings and/or nights per month	Noise levels from on-site activities are predicted to be more than 5dBA above the NML for more than: 2 consecutive evenings and/or nights per week; and 3 non-consecutive evenings and/or nights per week; and 10 evenings and/or nights per month
Sleep Disturbance L _{Amax}	Predicted maximum noise levels from on-site activities are below awakening levels of 55dB L _{Amax} internal	Predicted maximum noise levels from on-site activities are below awakening levels of 55dB L _{Amax} internal
Vibration criteria	Predicted vibration levels are below the relevant vibration criteria for cosmetic damage.	Predicted vibration levels are above the relevant vibration criteria for cosmetic damage.

5. Application of mitigation measures

5.1. Standard mitigation measures

Reasonable and feasible standard mitigation measures will be proposed and implemented for all OOHW in consultation with directly affected residents and sensitive land use(s) and approved by the relevant approval delegate (refer to Table 4-1). Where impacts on directly affected residents and sensitive land use(s) are predicted, the following measures will include:

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

5.2. Additional mitigation measures

Where construction noise and vibration levels are still predicted to exceed the noise or vibration objectives after the application of the standard mitigation measures, additional mitigation measures will be implemented in consultation with directly affected residents and sensitive receivers. Table 5-1 outlines the approach for the application of additional mitigation measures to minimise impacts of OOHW.

Table 5-1: Hierarchy for Application of Additional Mitigation Measures

Perception	Predicted airborne L _{Ae1(15min)} noise level receiver		Additional mitigation measures type	Mitigation levels
	dB(A) above RBL	dB(A) above NML		
OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am & 5pm – 10pm), Sun/Pub Hol (8am-6pm)				
Noticeable	5 to 10	< 5	-	NML
Clearly audible	10 to 20	5 to 15	N, R1, DR	NML+5
Moderately intrusive	20 to 30	15 to 25	V, N, R1, DR	NML+15
Highly intrusive	> 30	> 25	V, IB, N, R1, DR, PC, SN	NML+25
OOHW Period 2: Mon – Fri (10pm – 7am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)				
Noticeable	5 to 10	< 5	N	NML
Clearly audible	10 to 20	5 to 15	V, N, R2, DR	NML+5
Moderately intrusive	20 to 30	15 to 25	V, IB, N, PC, SN, R2, DR	NML+15
Highly intrusive	> 30	> 25	AA, V, IB, N, PC, SN, R2, DR	NML+25
Notes				
N – Notification SN – Specific Notification V – Verification IB – Individual Briefings RO – Respite Offer		R1 – Respite Period 1 R2 – Respite Period 2 DR – Duration respite PC – Phone calls AA – Alternative Accommodation (when noise impact is expected to be for more than two consecutive nights)		

5.3. Mitigation measures for other sensitive periods

Work that results in noise levels above the NMLs at community, religious, educational institutions, noise and vibration-sensitive businesses and critical working areas will not be timetabled during sensitive periods as far as reasonably practicable. The mitigation measures will include consultation with directly affected residents and sensitive land use(s) to identify reasonable and feasible options.

6. Consultation

6.1. Respite periods

As required by the Community Communications Strategy (CCS) and CoA C29, in order to undertake out-of-hours work outside the hours specified under CoA D3, the appropriate respite periods must be identified for the out-of-hours work in consultation with the community at each affected location on a regular basis. This consultation must include (but not be limited to) providing the community with:

- A progressive schedule of likely out-of-hours work;
- A justification and description of the potential work, location and duration of the out-of-hours work;
- The noise characteristics and likely noise levels of the construction / activities being undertaken;
- Mitigation and management measures which aim to achieve the relevant NMLs and vibration criteria under Conditions D12 and D15 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers); and
- Respite periods

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 and the Planning Secretary for information prior to undertaking the work scheduled for the subject period.

Respite periods can be any combination of days or hours where out-of-hours work would not be more than 5 dB(A) above the rating background noise level at any residence.

6.2. Notification of OOHW

Community notifications will be used as a mitigation measure for receivers of potential noise and vibration impacts from OOHW. Where OOHW have been scheduled, the Contractor's Community Liaison Representative will notify the directly affected residents and sensitive land use(s) of upcoming OOHW in accordance with the procedures in the approved CCS.

Specific notifications of OOHW events will be issued to directly affected residents and sensitive land use(s) at least five days, and not more than 14 working days, prior to the OOHW commencing.

OOHW notifications will be prepared generally in accordance with the CNVG. The notifications will:

- Be undertaken by letterbox drop or email (or equivalent).
- Clearly outline the reason that the work is required to be undertaken outside standard construction hours specified.
- Include a diagram that clearly identifies the location of the proposed works in relation to nearby cross streets and local landmarks.
- Include details of relevant time restrictions that apply to the proposed works.
- Clearly outline in plain English, the location, nature, type of work, scope and days and dates and hours of the proposed works.
- Detail the expected noise impact of the works on directly affected residents and sensitive land use(s)
- Detail mitigation and management measures and proposed respite periods.
- Clearly state how complaints may be made and additional information obtained.
- Include the number of the 24-hour telephone complaints line, site contact (where available) and the Project website address

In accordance with C29g the ER / HW will notify the Planning Secretary of approved low risk out-of-hours works.

7. Monitoring and Compliance

7.1. Monitoring of OOHW

All OOHW monitoring will be carried out by an appropriately trained person and in accordance with the approved Construction Noise and Vibration Monitoring program.

7.2. Complaints Management

Complaints received as a result of the OOHW will be managed in accordance with the Project CCS and be recorded in the Complaints Register. On receipt of any complaints, the JH Environment Manager (or delegate) will carry out an investigation and where feasible and reasonable, make changes to the works to address the issue of concern. Where relevant to the detail of the complaint, monitoring will be undertaken to confirm compliance with the predicted noise and vibration levels identified in the assessment.

7.3. Exceedances and non-compliances

Where monitoring identifies any exceedances of the levels predicted in the OOHW assessment, a review of OOHW activities will be carried out to determine whether noise or vibration levels can be further reduced via additional feasible and reasonable measures.

Where the processes and systems outlined in this protocol are not followed or where work isn't in accordance with the approved OOHW application form, the event will be considered a noncompliance with this protocol. The noncompliance will be managed in accordance with the CEMP.

7.4. Record Keeping

The JH Environmental Manager (or delegate) will maintain accurate records of all OOHW applications, noise and vibration monitoring undertaken during OOHW for the duration of the works.

8. Review and Improvement

8.1. Continuous Improvement

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

The continuous improvement process will be designed to:

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

The Project Environment Manager (or delegate) is responsible for ensuring stage-specific environmental risks are identified and included in the Project risk register and appropriate mitigation measures implemented throughout the construction, as part of the continuous improvement process. The process for ongoing risk identification and management during construction is outlined in the CEMP.

8.2. OOHW Protocol Version Control

The processes described in the CEMP may result in the need to update or revise this Plan. Only the Project Environment Manager (or delegate) has the authority to approve changes to the requirements of this Protocol. Minor amendments to the Protocol may be approved by the ER in accordance with the CEMP and are to be implemented for the duration of construction and for any longer period set out in the monitoring programs or specified by the Planning Secretary, whichever is the greater. Amendments not considered minor by the ER need to be approved by the Planning Secretary.

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

Appendix A – OOHW Application Form

Part A: Document Sign-off <i>(to be completed prior to submission)</i>			
	Name:	Signature:	Date:
Document Author:			
Project Manager:			
Environmental Representative			

(Please complete all highlighted example sections where applicable (delete where not applicable) and remove highlighting prior to submission of request)

Part B: Proposal				
Project name:				
Duration:		Duration and proposed hours of work (timing of works):		
Specific Details:				
Justification <i>(state approved working hours the hours that are required and then a justification of why OoHW required?)</i>				
Location: <i>(Street name(s) & suburb)</i>				
Scope of works, outside of approved working hours:				
Equipment in use for out-of-hours works	Equipment Type:	Y/N	Specific Mitigation to be utilised:	
Risk Level	Type	Low Risk Factors	High Risk Factors	Assessed Risk Level (Low / High)
	Air-borne Noise (L _{Aeq15min})	Noise levels are predicted to be up to 5dBA above the NML, or	Noise levels are predicted to be more than 5dBA above the NML for more than:	

		Noise levels are predicted to be more than 5dBA above the NML for a maximum of: • 2 consecutive evenings and/or nights per week; and • 3 non-consecutive evenings and/or nights per week; and • 10 evenings and/or nights per month	• 2 consecutive evenings and/or nights per week; and • 3 non-consecutive evenings and/or nights per week; and • 10 evenings and/or nights per month	
	Sleep Disturbance (L _{Amax})	Predicted maximum noise levels are below awakening levels of 55dB L _{Amax} internal	Predicted maximum noise levels are below awakening levels of 55dB L _{Amax} internal	

Part C: Impacts, Mitigation and Communication Proposed

Noise Impacts

Other Impacts

Additional Mitigation Measures

Community Notification

Part D: Submission, Review and Approval

Document Submission Instructions

OoHW request requires the contractor complete and submit this form to the HWC Project Manager for review. Works cannot proceed until application is signed off by the relevant approval delegate (refer to Section 4.4 of the OoHW Protocol).