

# Victorian Desalination Project



Plant & General Area D&C Environmental Management Plan  
Attachment I8 – Noise and Vibration Sub Plan

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**Definition and Acronyms**

The following Definitions and Acronyms are used in this document:

Ambient	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.
AQM	Air Quality Management
BOM	Bureau of Meteorology
CWMS	Construction Work Method Statements
D&C	Design and Construct Phase of the VDP
dB	Decibel. The unit of sound level.
dBA	A-weighted decibel. The A-weighting approximates the response of the human ear
DEWHA	Department of the Environment, Water, Heritage and the Arts
DSE	Department of Sustainability and Environment
DPI	Department of Primary Industries
DPIW	Department of Primary Industries and Water
EES	Environmental Effects Statement
EIRP	Environmental Incident Response Plan
Emergency Response Services	May, as appropriate, mean police, ambulance, fire brigades, state emergency services, hospitals or other specialist groups
EMP	Environmental Management Plan
EMR	Environmental Management Representative
EMS	Environmental Management System
Environmental Hazard	A state of danger to human beings or the environment whether imminent or otherwise resulting from the location, storage or handling of any substance having toxic, corrosive, flammable, explosive, infectious or otherwise dangerous characteristics (s.4, <i>Environment Protection Act 1970</i> )
Environmental Incident	Any event that causes, has caused or has the potential to cause an Environmental Hazard or Pollution (from section 4, Appendix S3, PS&PR). [Please see the definition of <i>Environmental Hazard</i> . Please see the definitions of <i>Pollution of Atmosphere</i> , <i>Pollution of Land</i> and <i>Pollution of Waters</i> for the legislative definitions of ‘Pollution’ in Victoria.]
EO	Environmental Officer
EPA	Victorian Environment Protection Authority
EP Act	<i>Environment Protection Act 1970</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
JHA	Job Hazard Analysis



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JSEA	Job Safety and Environmental Analysis
L90	The noise level exceeded for 90% of the measurement period, usually measured in dBA. This is commonly referred to as the background noise level.
Leq	The equivalent continuous sound level. This is commonly referred to as the average noise level and is usually measured in dBA.
Lmax	The maximum noise level. The highest noise level which occurs during the measurement period, usually measured in dBA.
LCpeak	The C-weighted peak noise level measured or estimated at a worker's ear during any noisy event.
Lw (or SWL)	Sound Power Level. The level of total sound power radiated by a sound source.
NAP	National Action Plan
Near Hit	Any unplanned event in the workplace that, although not resulting in environmental damage, had the potential to do so
NEPM	National Environment Protection Measure
Noise	Unwanted sound.
Overpressure	The noise from blasting is called overpressure and is measured differently from other environmental noises. The noise level index used is L <sub>Lin,Peak</sub> . This is the linear peak noise level and is a measure of the absolute maximum acoustic pressure. This is not related directly to the noise level as perceived by the human ear, but does relate directly to the ability of the acoustic pressure wave to do damage, either to human hearing or to building structures.
PEM	Protocol for Environmental Management
Performance Criteria	The Performance Criteria outline the overarching requirements based on the environmental objective for each Subject Area of Schedule A of Appendix S3 of the Project Scope and Project Requirements
PR	Performance Requirements
PS&PR	Project Scope and Project Requirements
TBM	Tunnel Boring Machine
Vibration	The oscillating, reciprocating, or other periodic motion of a rigid or elastic body or medium forced from a position or state of equilibrium. Vibration can be measured in terms of its displacement, velocity or acceleration. The common units for velocity are millimetres per second (mm/s).
PPV	The peak particle velocity is a measure of vibration used when assessing risk of property damage.

## 1 Purpose and scope

This Noise and Vibration Sub Plan describes the existing noise environment and the management measures required to mitigate the potential noise impacts from the design and construction (D&C) of the Victorian Desalination Project (VDP) Wonthaggi plant site. This sub plan does not specifically include potential noise impacts on worker health and safety, which are addressed in the project-wide OH&S Management Plan.

This sub plan must be read in conjunction with the Environmental Management System (EMS) Manual, D&C Environmental Management Plan (D&C EMP) and the D&C Plant and General Area EMP. This sub plan forms an attachment to the D&C Plant and General Area EMP and addresses requirements listed in the Environmental Compliance Tracker ((TDV-0-EV-RP-0001-01)), including licence conditions, Performance Requirements (PRs), Performance Criteria (PC) and other obligations which may influence noise and vibration.

Specific management measures from this and other environmental sub plans have been incorporated in to Work Area Packages (WAP) and Work Packs (WP) which include Construction Work Method Statements (CWMS), Site Environmental Plans (SEP) and Job Safety and Environmental Analysis (JSEA's) where applicable.

## 2 Objectives and Targets

The objective of this sub plan is to ensure there are no health risks or loss of amenity due to noise and vibration during construction and to ensure project objectives, targets and obligations, including PRs and associated criteria, are met.

### 2.1 Performance Requirements

Table 1 outlines the relevant noise and vibration objectives and targets nominated to be achieved during the D&C phase of the VDP. Numbered entries are applicable performance requirements taken from Schedule A of Appendix S3 of the Project Deed.

**Table 1: Environmental objectives, targets and performance requirements**

Issue	Objective/Performance Criteria	Target/Performance Requirement
Airborne Noise	<p><b>Protect neighbourhood amenity</b></p> <p>Minimise impacts from airborne noise <b>(PR#24158). D,C</b></p> <p>During construction, comply with EPA Publication 1254 as well as relevant aspects of EPA Publication 480 and N3/89 for the Desalination Plant. <b>(PR#24158). D,C</b></p> <p>Comply with EPA N3/89 during day and evening, and with</p>	<p>Develop and implement communication strategy with key stakeholders and the community to manage the impact of construction noise and limit disturbance to local amenity <b>(PR#24160).</b></p> <p>Model and report predicted airborne noise levels during operation to demonstrate that the design meets the performance criteria. As part of the modelling and reporting exercise, include an assessment of tonality and other character adjustments with consideration to the relevant provisions of State Environment Protection Policy N1. If found present, tonality or character</p>

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Vibration	<p>State Environment Protection Policy N1 at night-time for the Leased Area <b>(PR#24158). D,C</b></p>	<p>adjustments should be eliminated through the detailed design stage. Alternatively reduced noise limits, with consideration to State Environment Protection Policy N1, may be applicable <b>(PR#24161), D</b></p> <p>Develop and implement a noise mitigation strategy for construction activities <b>(PR#24162).C</b></p> <p>Night time construction works outside the provisions of EPA Publication 1254 should be subject to a specific noise mitigation strategy, through consultation with the EPA prior to commencement of works <b>(PR#24163).C</b></p> <p>Monitor and report on airborne noise levels <b>(PR#24164).C</b></p>
	<p><b>Protect buildings from vibration impacts</b></p> <p><b>Protect the dune system from vibration</b></p> <p>Compliance with Section 5.5 of EPA Publication 480: Environmental guidelines for major construction sites <b>(PR#25165). D,C</b></p> <p>Minimise damage from vibration caused by construction activities and Desalination plant activities <b>(PR#25165). D,C</b></p>	<p>Develop and implement methods and management systems to protect buildings from vibration impacts <b>(PR#25167).D,C</b></p> <p>Undertake site investigations, property and land surveys and ground and infrastructure condition surveys of vibration generation works prior to and after carrying out vibration generation works on a case-by-case basis for all potentially impacted dwellings <b>(PR#25168).C</b></p> <p>During any blasting, undertake a monitoring strategy to measure and mitigate ground vibrations in the dune system <b>(PR#25169).C</b></p> <p>Short-term vibration levels must not exceed 3 – 10mm/s peak particle velocity (frequency dependent limit) at Heritage buildings, 5 to 20 mm/s Peak Particle Velocity (frequency dependent limit) at rural and residential buildings and 20 to 50mm/s peak particle velocity (frequency dependent limit) at commercial or industrial buildings <b>(PR#25170).D,C</b></p>

D = Design phase requirement; C= Construct phase requirement

All Project Deed PRs from Schedule A of Appendix S3 are contained within the D&C Plant EMP Attachment G – Environmental Obligations Register). The Environmental Compliance Tracker tracks conformance with these PRs and is updated regularly by the TDJV Environmental Coordinator and Area Environmental Managers.

## 2.2 Noisecriteria – nearby residences

EPA requirements are that:

- ~ Daytime – all reasonable efforts must be made to minimise noise.
- ~ Evening – noise limit to be complied with when practicable. If not practicable, impacts to be managed in accordance with EPA publications 1254 and 480, and project obligations.

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- ~ Night – noise to be inaudible at nearest residences when practicable. If not practicable, impacts to be managed in accordance with EPA publications 1254 and 480, and project obligations.

EPA noise limits and acceptable times of operation that support these requirements are described in Table 2 below.

**Table 2: Construction noise management – EPA requirements**

Period	Day of week	Start time	End time	Noise limit
Day	Mon-Fri	0700hrs	1800hrs	*
	Sat	0700hrs	1300hrs	*
Evening	Mon-Fri	1800hrs	2200hrs	37dBA
	Sat	1300hrs	2200hrs	37dBA
	Sun, Pub hol	0700hrs	2200hrs	37dBA
Night	Mon-Sun	2200hrs	0700hrs	Inaudible

\* No limits are currently prescribed in N3/89 but activity based assessment applies. Limits will be prescribed in *Noise from Industry in Regional Victoria (NIRV)*, a draft guideline for comment issued by EPA Victoria (Publication 1316) in December 2009. Once finalised this will replace N3/89.

### 2.3 Noise criteria – occupational health and safety

Occupational noise exposure should not exceed LAeq, 8h 85dBA, or peak levels of LCpeak 140dBC. Further guidance can be found in the Occupational Health and Safety Regulations 2007, Statutory Rule No.54/2007.

These criteria are provided for information only and are formally addressed in the project-wide OH&S Management Plan.

### 2.4 Vibration criteria – nearby buildings

Short term vibration levels must not exceed:

- ~ 3-10mm/s peak particle velocity (PPV) at heritage buildings
- ~ 5-20mm/s PPV at rural and residential buildings
- ~ 20-50mm/s PPV at commercial or industrial buildings

## 3 Legal, regulatory, licence, permits and approval requirements

This sub plan has been developed in accordance with the following legislation and standards:

- ~ *Environment Protection Act, (1970)*
- ~ EPA Best Practice Environmental Management – Environmental Guidelines for Major Construction Sites (1996) (Publication 480).
- ~ EPA Information Bulletin Noise Control Guidelines TG 302/92 (superseded)



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- ~ EPA Technical Guideline 1254 Noise Control Guideline (EPA 1254)
- ~ EPA Interim guidelines for control of noise from industry in country Victoria N3/89
- ~ Noise from Industry in Regional Victoria (NIRV), EPA draft guideline issued for comment December 2009 (Publication 1316)

The legislative and contractual requirements for the D & C Plant and General Area are summarised in:

- ~ D&C Plant and General Area EMP – Attachment E – Environmental Legislation Register
- ~ D&C Plant and General Area EMP – Attachment F – Environmental Licence, Permit and Approval Register
- ~ D&C Plant and General Area EMP – Attachment G – Environmental Obligations Register.

The applicable PRs from Project Deed Schedule A of Appendix S3 are provided in Table 1.

Under the Project Deed the D&C EMP, all sub plans and any changes to these must be endorsed by the State, who may refer aspects to relevant agencies.

EPA and any other relevant agencies and stakeholders will be consulted with regard to any specific approval requirements in relation to this sub plan. The requirements of any permits, licences and approvals obtained will be placed in the Environmental Licence, Permit and Approval Register on receipt and updated in the Environmental Compliance Tracker.

## 4 Existing conditions and issues

The existing noise environment around the site is characterised by:

- ~ Natural noise including surf, wind and rain
- ~ Traffic (on Lower Powlett Road and Mouth of Powlett Road)
- ~ Local industry (predominantly agriculture and a small saw mill, approximately 500 metres east on Lower Powlett Road).

These existing environmental noise conditions have not historically caused issues with nearby residents

### 4.1 Sensitive receptors

Twelve residences have been identified as potentially sensitive to noise and vibration disturbance within a distance of 1.5 kilometres of the site. These are shown in Figure 1.

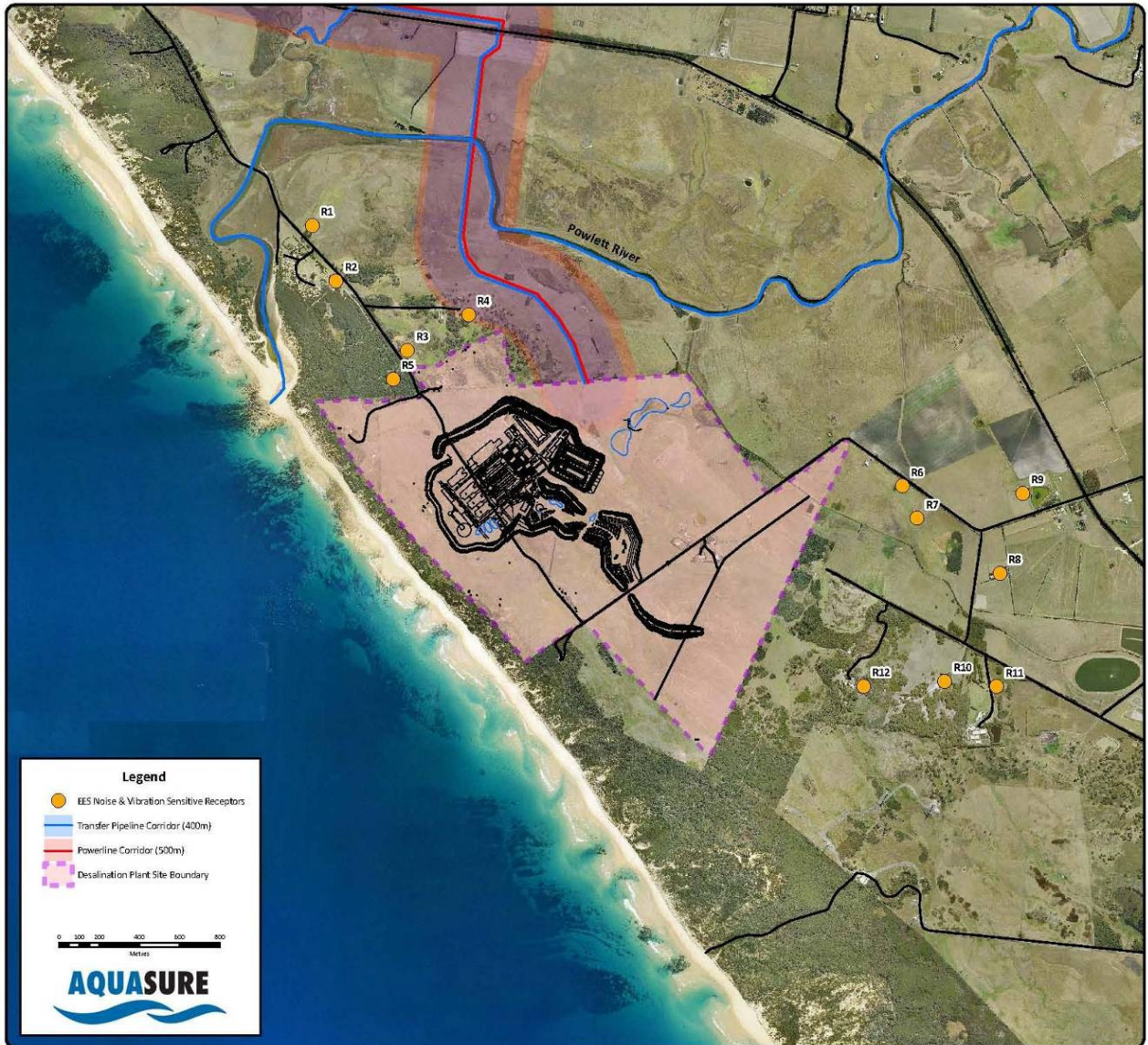


Figure 1: Sensitive receptors in the proximity of the desalination plant

## 5 Environmental Risks

An environmental risk assessment has been carried out for the D & C Plant and General Area works. This assessment is contained in the Environmental Risk Register, Attachment C of the D&C Plant and General AreaEMP. Table 3 summarises the potential hazards from project activities, potential impacts of these hazards and the risk of occurrence as rated by the environmental risk assessment.

**Table 3: Summary of plant and general area risk assessment for Noise & Vibration**

Activity posing hazard	Risk/ Potential Impact	Inherent Risk (before controls)	Control Measure Reference (Att I08.1)
Site clearing and set up for site offices including civil works and service installation	nuisance to neighbours and fauna	Moderate	#1-3, 7, 11, 15-20, 22-23
noise nuisance (piling, metal grinding, general construction)	nuisance to neighbours and fauna	High	#4-18, 20-23
Vibration from piling equipment	nuisance to neighbours and fauna	Moderate	#24-29
Noise and vibration from initial excavations to place tunnelling equipment	Disruption and disturbance to sensitive receivers / nearby residences	High	#1-3, 5-18, 24-29
Construction of desalination plant buildings and tunnels	Noise and vibration impacts to sensitive receivers	High	All (#1-29)
Noise and vibration from tunneling equipment	Disruption and disturbance to sensitive receivers / nearby residences	Moderate	#1-18, 20-29
Noise from tunnelling equipment ventilation system outlets	Disruption and disturbance to sensitive receivers / nearby residences	Moderate	#1-4, 6-7, 12, 14, 17, 21

Attachment C of the D&C Plant and General Area EMP should be consulted for a comprehensive assessment of these risks.

## 5.1 Potential sources

The major noise and vibration emissions from D & C activities will be related to piling works, concreting works, excavations, tunnel boring works and general vehicle movements. All onsite activities are likely to be subject to 24-hour operation.

### 5.1.1 Noise

The major potential noise sources are anticipated to include, but not be restricted to:

- ~ General surface earthworks
- ~ Excavation works, piling, rock crushing/hammering and trenching works
- ~ Tunneling activities

### 5.1.2 Vibration

The potential vibration sources may include, but not be restricted to:

- ~ Rock crushing / hammering
- ~ Tunnel boring machine operations



## **6 Control, Management and Mitigation Measures**

Attachment I8.1 describes a range of mitigation and control measures to be used to minimise and manage potential noise impacts. Control measures implemented on site will be recorded in the Weekly Environmental Inspection Checklist (FM-TDV-EN-0-X-000-0006) and records retained on site.

The measures in Attachment I8.1 are designed to address potential impacts from the risks outlined in Section 5 as well as deliver on the objectives, targets and in particular the PRs listed in Section 2. They include requirements and responsibilities for design, construction, evaluating performance and reporting.

Attachment I8.1 also references Design Packages (DPs) in design-related control measures. PRs that relate to design are addressed in accordance with the Design Management Plan (PL-TDV-PM-0-X-000-0011-0-00).

## **7 Site environmental plans**

A single Site Environmental Plan (SEP) has been developed for the whole plant site that details environmental management measures such as permanent controls, No Go zones, property boundaries and significant flora and fauna species. These measures are implemented to minimise potential impacts of construction activity on the environment and community.

The information contained in the SEP is presented in pictorial and tabular drawing format. This is to make them easy to use by all site personnel, consultants and subcontractors. SEPs are updated to reflect operating practices on a regular basis.

The noise and vibration controls set out in the SEP are drawn from this sub plan. Additional practical management measures are picked up and covered by the Weekly Environmental Checklist.

SEPs are held by Area Environment Managers.

## **8 Evaluating performance and reporting**

Monitoring of construction noise and vibration will be undertaken:

- ~ Prior to commencement of works to establish baseline conditions
- ~ Within two weeks of commencement of works to assure nearby residents that monitoring is underway
- ~ In response to complaints, where the complaint may have some basis. Additional monitoring is to be recorded using the Plant Noise Monitoring Record Sheet (FM-TDV-EN-2-X-000-0005).

Condition surveys of nearby buildings may be undertaken as outlined in the Community Involvement Plan (CIP).

Environmental audits and site environmental inspections (SEIs) are scheduled to detect where PRs are not being met with appropriate corrective actions developed to address these issues as they arise. Schedules, responsibilities and reporting procedures for noise and vibration monitoring are set out in the Monitoring, inspection, audit and reporting schedule - Attachment L of the D&C Plant and General Area EMP.



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Monitoring will be undertaken by appropriately qualified personnel and in accordance with the appropriate standards and guidelines, as specified in Attachment L of the D&C Plant and General Area EMP. Monitoring equipment will be calibrated in accordance with relevant Australian Standards. Where monitoring identifies levels exceeding the targets specified in this sub plan, contingency measures will be followed (see Section 9).

Underwater noise and vibration monitoring is covered by the Marine Area EMP.

### **9 Contingency measures**

The environmental risk assessment did not identify circumstances that could occur outside normal operating conditions that would result in excessive noise and vibration impacts.

Should a noise or vibration complaint be received or noise/ vibration monitoring results indicate an exceedance, the contingency procedure in Figure 2 will be followed.

All environmental incidents will be responded to in accordance with the plant site Environmental Incident Response Plan (EIRP). The EIRP provides project specific details for the identification of and response to potential environmental related incidents at the plant site during the D&C phase of the VDP. It provides guidance on strategies to manage potential and actual incidents, as well as follow-up and reporting requirements.

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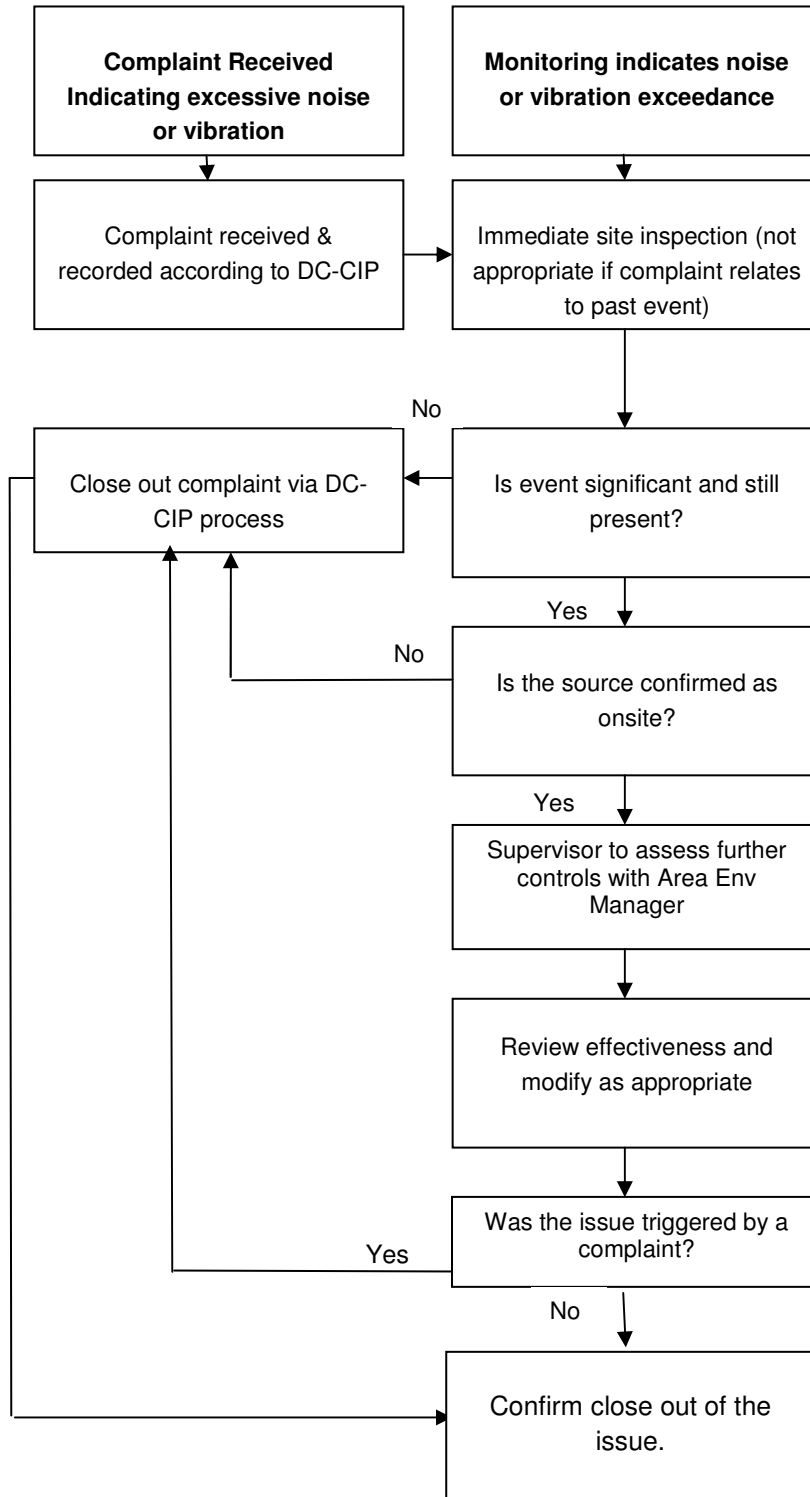


Figure 2: Excessive noise or vibration – contingency procedure

## 10 References

### 10.1 VDP Documents

- ~ Environmental Effects Statement, Volume 3, Chapter 9
- ~ Minister of Planning VDP Assessment under the Environment Effects Act 1978, (Jan 2009)
- ~ Environmental Effects Statement, Technical Appendix 76, GHD 2008

### 10.2 Technical/ legislative documents

- ~ GHD (2008) Report for Desalination Project Impact Assessment Report Noise and Vibration (Plant), GHD, Melbourne, Victoria (Appendix 50).

#### 10.2.1 Noise

- ~ EPA Victoria Environmental Guidelines for Major Construction Sites, publication 480 (1996)
- ~ Interim Guidelines for the Control of Noise from Industry in Country Victoria, EPA Victoria, Publication N3/89, April 1989 (Referred to hereafter as N3/89)
- ~ Noise from Industry in Regional Victoria (NIRV), draft guideline for comment, EPA Victoria Publication 1316, December 2009 (Scheduled to replace N3/89)
- ~ State environment protection policy (Control of Noise from Commerce, Industry and Trade) No. N-1 (SEPP-N1)
- ~ EPA Technical Guideline 1254 Noise Control Guideline (EPA 1254)
- ~ EPA Victoria – A guide to the measurement and analysis of noise (EPA Publication 280, 1991)
- ~ Australian Standard AS 1055.1 – 1997 Acoustics – Description and Measurement of Environmental Noise (AS 1055.1 – 1997)
- ~ International Standard ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation
- ~ ISO4872 Acoustics – Measurement of airborne noise emitted by construction equipment intended for outdoor use; Method for checking compliance with noise limits
- ~ ISO3744:1994 Acoustics – Determination of sound power levels of noise sources using sound pressure – Engineering method in an essentially free field over a reflecting plane
- ~ AS2012.1-1990 Acoustics – Measurement of airborne noise emitted by earth moving machinery and agricultural tractors – Determination of compliance with limit for exterior noise
- ~ AS2436-1981 Guide to the noise control of construction maintenance and demolition sites
- ~ AS1217 Acoustics – Determination of sound power levels of noise sources. Part 5 – Engineering Method and Part 7 – Survey Method.

#### 10.2.2 Vibration

- ~ NSW Department of Environment and Climate Change (DECC) Assessing Vibration: A Technical Guideline (2006)
- ~ AS2670.2 Evaluation of human exposure to vibration. Part 2 – Vibration in buildings (1-80Hz)



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- ~ British Standard BS7385-2:1993 Evaluation and Measurement for Vibration in Buildings, Part 2 – Guide to damage levels from ground-borne vibration
- ~ German Standard DIN 4150-3:1999 Structural Vibration – Part 3: Effects of vibration on structures



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## **ATTACHMENT I8.1 NOISE AND VIBRATION – CONTROL MEASURES TABLE**

## ATTACHMENT I8.1 NOISE AND VIBRATION – CONTROL MEASURES TABLE

#	Issue	PR # addressed	Control Measure	Responsibility *	Project Phase	Evidence **	Audit Check
	<b>Noise</b>						
1	Noise surveys	24164	Undertake baseline noise surveys at the Desalination plant site prior to the commencement of construction activities	Area Environment Manager	Design	Monitoring records	
2	Noise surveys	24164	Monitor and report on noise levels. A noise survey has been undertaken within two weeks of commencement, followed by additional surveys in response to community concerns, if warranted. Additional surveys would only be required if circumstances have changed, such as if new activities were commenced.	Area Environment Manager	Construct	Monitoring records, consultant reports	
3	Noise Modelling	24161	Design Package DP 0-0200 Project Wide Noise Control will model and report predicted airborne noise levels during operation to demonstrate that the design meets the performance criteria.	Design Package Manager	Design	Verified design	
4	Noise from TBM	24158	Assess noise impacts of TBM, crushing and grinding activities and implement controls as appropriate	Area Environment Manager	Construct	Monitoring records, inspection records	
5	Blasting	25169	No blasting will be undertaken throughout the project.	Site Manager	Construct	Daily logs	

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#	Issue	PR # addressed	Control Measure	Responsibility *	Project Phase	Evidence **	Audit Check
6	Night-time noise	24163	<p>Night-time construction works outside the provisions of EPA 1254 are subject to a specific noise mitigation strategy, developed through consultation with the project acoustic consultant and EPA, prior to commencement of works. With regard to excessive evening and night-time noise management:</p> <ul style="list-style-type: none"> <li>- The works to be undertaken should be identified and described, including the duration and times of day of the works. In particular, 'unavoidable works' should be identified in accordance with EPA publication 1254</li> <li>- Specific noise mitigation strategies should be identified. In particular, 'low-noise or managed-impact works' should be identified in accordance with EPA publication 1254</li> <li>- Any relevant authorities should be consulted</li> </ul>	Area Environment Manager	Design	EPA-approved strategy, meeting minutes	
7	Strategic Controls	24162	An overall project noise mitigation strategy will be developed in consultation with EPA Victoria.	Area Environment Manager	Design	EPA-approved strategy, meeting minutes	
8	Equipment Controls	24158	All pneumatic tools operated near a residential area must be fitted with an effective silencer on their air exhaust port	Construction Manager	Construct	Inspection records	
9	Equipment Controls	24158	All mechanical plant must be silenced by best practical means using current technology. For example, noise suppression devices should be maintained to the manufacturer's specifications and internal combustion engines are to be fitted with a suitable muffler in good repair	Construction Manager	Construct	Inspection records	
10	Equipment Controls	24158	Review fixed and mobile equipment fleet with a preference for less noisy equipment wherever possible. Equipment used on site would typically be in good condition and good working order	Construction Manager	Construct	Inspection records	

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#	Issue	PR # addressed	Control Measure	Responsibility *	Project Phase	Evidence **	Audit Check
11	Equipment labelling	24158	Noise Labels are required to be affixed to new mobile air compressors and pavement breakers. The unit with the lowest noise rating which meets the requirements of the job should be used	Construction Manager and Site Manager	Construct	Inspection records	
12	Work methods	24158, 24162	Review work methods with a preference for quieter and non-vibration generating methods wherever possible. This is essential for any night-time activities	Construction Manager	Construct	CMWS	
13	Locating noisy equipment	24158	Fixed equipment (i.e. pumps, generators, compressors) should be located as far as possible from the nearest residences or screened by temporary barriers or acoustic enclosures	Construction Manager	Construct	Site Environmental Plan	
14	Noise barriers	24158	Spoil berms or other noise barriers will be erected to assist in reducing noise impacts throughout the construction period	Construction Manager	Construct	Site Environmental Plan	
15	Material dumps	24158	Material dumps should be located as far as possible from the nearest residences	Site Manager	Construct	Site Environmental Plan	
16	Loading/unloading areas	24158	Whenever possible, loading and unloading areas should be located as far as possible from the nearest residences or screened by temporary barriers or acoustic enclosures	Site Manager	Construct	Site Environmental Plan	
17	Management Controls	24158	Equipment which is used intermittently should be shut down when not in use	Construction Manager	Construct	Inspection records	
18	Management Controls	24158	All engine covers should be kept closed while equipment is operating	Construction Manager	Construct	Inspection records	
19	Site layout	24158	Site buildings, access roads and plant should be positioned such that the minimum disturbance occurs to the locality	Construction Manager and Site Manager	Design	Verified Design	

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#	Issue	PR # addressed	Control Measure	Responsibility *	Project Phase	Evidence **	Audit Check
20	Induction	24162	All site workers (including subcontractors and temporary workforce) to be inducted regarding the potential for noise and vibration impacts upon local residents and encouraged to take all practical and reasonable measures to minimise noise during the course of their activities	Site Manager	Construct	Induction & training records	
21	Limiting working hours	24158, 24163	Where practicable and safe noisy construction activities, including vehicular movements to and from the site, should be limited to the following times of day: <ul style="list-style-type: none"> <li>- 7:00am to 6:00pm Monday to Friday</li> <li>- 7:00am to 1:00pm Saturdays</li> </ul>	Site Manager	Construct	Inspection records	
22	Communication strategy	24160	Develop and implement a communication strategy with the key stakeholders and the community to manage the impacts of construction noise and limit disturbance to local amenity. Details included in the Community Involvement Plan (CIP)	Stakeholder and Community Relations Manager	Design	CIP and stakeholder meeting records	
23	Community Liaison	24160	Inform local residents about the construction program and progress on a regular basis, particularly when noisy or vibration-generating activities are planned, and prior to commencement of each phase with targeted discussion about noise impact minimisation	Stakeholder and Community Relations Manager	Construct	Stakeholder meeting records	
	<b>Vibration</b>						
24	Vibration surveys	25168	Baseline vibration surveys were undertaken at the prior to the commencement of construction activities	Area Environment Manager	Design	Monitoring records	
25	Vibration surveys	25167, 25169, 25170	Monitor and report on vibration levels. A vibration survey was undertaken within two weeks of commencement, and will be followed by additional surveys in response to community concerns, if warranted. Additional surveys would only be required if circumstances have changed, such as if new activities were commenced.	Area Environment Manager and Site Manager	Construct	Monitoring records	

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#	Issue	PR # addressed	Control Measure	Responsibility *	Project Phase	Evidence **	Audit Check
26	Vibration Control Plans	25167, 25169	Vibration Control Plans have been prepared prior to tunnel boring, pile driving, blasting or other activities that may generate high levels of vibration	Area Environment Manager and Site Manager	Construct	Vibration Control Plans	
27	Community Liaison	25165	If warranted, offer condition surveys to any nearby residents that may be concerned about vibration damage.	Stakeholder and Community Relations Manager	Construct	Stakeholder meeting records	
28	Community Liaison	25165	Develop and implement a communication strategy (Details included in the Community Involvement Plan) with the key stakeholders and the community to manage the impacts of construction vibration and limit disturbance to local amenity (see noise section above for more detail).	Stakeholder and Community Relations Manager	Design	CIP and stakeholder meeting records	
29	Design vibration controls	25167	The following design packages incorporate methods and management systems to protect nearby buildings from vibration impacts: DP 0-0200 Project Wide Noise Control DP 1-0005 Seawater Lift Pumpstation - Pumps DP 3-0514 - Pressure Reducing Station Detail & Pit - DP1	Design Package Manager	Design	Verified designs	

\* The *Responsibilities* column refers in many cases to senior positions within the project organisation, due to the changing nature of project teams. In practice some responsibilities may be delegated by the person nominated.

\*\* See D&C Plant and General Area EMP Attachment G – Environmental Compliance Tracker.