Six Mile Creek Dam Safety Upgrade Project

Noise and Vibration Management Plan

Document No: LMDIP-05829-GNL-ENV-MPL-0005

Revision 0 | April 2025

Definitions & Abbreviations

Term	Definition
Appropriately qualified person / AQP	A person having the qualifications, experience or standing appropriate to undertake the work required.
AQO	Acoustic Quality Objectives
CEMP	Construction Environmental Management Plan
CG	Coordinator-General
CGCR	Coordinator-General's change report – Construction
CM	Construction Manager
CNVIA	Construction Noise and Vibration Impact Assessment
CSM	Community & Stakeholder Manager
DETSI	Department of Environment, Tourism, Science and Innovation
EMP	Environmental Management Plan
Eng	Engineer
EP Act	*Environmental Protection Act 1994* (Qld)
EPP Noise	*Environment Protection (Noise) Policy 2019*
EPBC Act	*Environment Protection & Biodiversity Conservation Act 1999* (Cth)
ESM	Environment and Sustainability Manager
HSM	Healthy and Safety Manager
IAR	Impact Assessment Report
mm/s	Millimetres per second
MNES	Matters of national environmental significance
NC Act	*Nature Conservation Act 1992* (Qld)
OCG	Office of Coordinator General
PHA	Plant Hazard Assessment
PM	Project Manager
PPV	Peak particle velocity
RBL	Rating background level
SEP	Site Environmental Plan
Sup	Supervisor

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Tables

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1. Scope

The Noise and Vibration Management Plan (the Management Plan) is applicable to all construction phase works associated with the Lake Macdonald Dam Improvement Project (the Project). This Management Plan is to be read in conjunction with the:

- Site Environmental Management Plan (LMDIP-05829-GNL-ENV-MPL-00001)
- Adaptive Management Plan (LMDIP-05327-GNL-ENV-MPL-00002)
- Community and Stakeholder Engagement Plan (LMDIP-05829-GNL-CMS-MPL-00001)
- Construction Communications and Engagement Plan (P11383-PLN-COM-001 / LMDIP-05242-GNL-CMS-MPL-00002)
- Species Management Programs (LMDIP-05327-GNL-ENV-REP-00002 and LMDIP-05327-GNL-ENV-REP-00003)
- Lake Macdonald Dam Improvement Project Construction Noise and Vibration Impact Assessment (V23-321.RT1.03. LMDIP-05477-GNL-ENV-REP-00001)

This Management Plan has been prepared to address the relevant imposed conditions outlined in the Coordinator-General's change report 2025 (CGCR) – Construction and recommendations (the addressable items).

1.1. Objectives

The objectives of this Noise and Vibration Management Plan are to:

- Minimise noise and vibration impacts from construction activities at residential locations near the Dam construction areas
- Protect buildings and other sensitive assets from vibration impacts
- Minimise impacts to neighbourhood amenity
- Determine what constitutes an exceedance and detail the corresponding corrective actions

1.2. Stakeholder Consultation

In preparing this Management Plan the following stakeholders were consulted and feedback considered in the development of management measures:

- The provided Office of Coordinator General (OCG) review comments in the draft Management Plans in May 2024

2. Specific Performance Measures

The specific performance measures relevant to the implementation of this Management Plan have been detailed in Table 1.

Table 1 Performance measures

Specific Performance Measure	Measurable Target(s)
No nuisance caused by the Project	No verified complaints or community concerns regarding noise or vibration
	Noise & vibration from construction activities will aim to achieve the levels at sensitive receptor locations outlined in Table 2 & Table 3
	The Project achieves Acoustic Quality Objectives outlined in the *Environmental Protection (Noise) Policy 2019* (EPP Noise), as provided in Table 2
	Compliance with the Project construction hours specified in Table 5
No structural impacts as a result of vibration caused by Project activities	Vibration limits for human comfort as outlined in Table 3 are not exceeded at any of the vibration sensitive receptors
	Vibration limits for protection of structures (Table 4) will not be exceeded at any structures

Table 2 Acoustic quality objectives

Sensitive Receptors	Time of Day	Acoustic Quality Objective (dB(A))			Environmental Value
		LAeq,adj,1hr	**LA10,adj,1hr**	**LA1,adj,1hr**	
Residence (for outdoors)	Daytime and evening	50	55	65	Health and well-being
Residence (for indoors)	Daytime and evening	35	40	45	Health and well-being
	Night-time	30	35	40	Health and wellbeing, in relation to the ability to sleep

Note: The EPP Noise advises the following times for the day, evening, and night periods:

- daytime: 7 am – 6 pm
- evening: 6 pm – 10 pm
- night: 10 pm – 7 am.

Table 3 Ground borne vibration – human comfort guidelines

Building	Work Period	Resultant PPV, mm/s	
		Lower Limit	Upper Limit
Dwellings (including hotels and motels)	Standard hours	1.0	1.0
	Non-Standard hours - evening	0.3	1.0
	Non-Standard hours – night time		
Medical/health buildings (wards, surgeries, operating theatres, consulting rooms)	All	0.3	1.0

Building	Work Period	Resultant PPV, mm/s	
		Lower Limit	Upper Limit
Educational/research facilities (rooms designated for teaching/research purposes)	While in use		
Community buildings (libraries, places of worship)	While in use	1.0	2.0

Table 4 Guideline vibration levels (peak particle velocity) for structural damage limits

Type of structure	Unit	Limit	Source
Reinforced or framed structures and heavy commercial buildings	mm/s at 4 hz and above	50	BS 5228-2:2009:2014
Buildings used for commercial purposes, industrial buildings, and buildings of similar design	mm/s	10	DIN 4150-3 1999
Dwellings and buildings of similar design and/or occupancy	mm/s	5	DIN 4150-3 1999
Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (e.g. heritage listed buildings)	mm/s	2.5	DIN 4150-3 1999
Pools	mm/s	5	Aligned with dwelling construction
Buried services - Masonry and plastic pipes	mm/s	25	DIN 4150-3 1999
Buried services - Clay, concrete, reinforced concrete, pre-stressed concrete, and metal (with or without flange)	mm/s	40	DIN 4150-3 1999
Buried services - Steel pipes (including welded pipes)	mm/s	55	DIN 4150-3 1999
Buried services - Electrical	mm/s	25	Energex and Ergon's Electrical Entity Requirements
Buried services - Telstra data and communications	mm/s	25	Nominated value
Buried services – Unity Water and Seqwater pipes and mains	mm/s	2	Nominated value

Table 5 Project construction hours

Work Period	Time
Standard construction hours	Monday – Friday 6:30 am to 6:30 pm Saturday 6:30 am to 4:00 pm
Non-Standard hours – day/evening	Monday – Friday 6:30 pm to 10:00 pm Saturday 4:00 pm to 10:00 pm Sunday 7:00 am to 10:00 pm

Work Period	Time
Non-Standard hours – night-time	Monday – Sunday 10:00 pm to 6:30 am

Note: Site working hours derived from section B.4.9, Appendix B of the impact Assessment Report and the Lake Macdonald Dam Improvement Project Construction Noise and Vibration Impact Assessment (V23-321.RT1.03. LMDIP-05477-GNL-ENV-REP-00001)
It is noted that these hours vary slightly from the EPP Noise – this is to allow for start-up and pack-down activities that are typically not noisy tasks.

3. Roles and Responsibilities

Roles and responsibilities applicable to the implementation of this Management Plan have been detailed in Table 6. These roles and responsibilities are in addition to those described in Table 9 of the SEMP.

Table 6 Roles and responsibilities

Role	Responsibility
Seqwater	• Manage the construction process as the Project proponent • Allocate sufficient resources to prepare, review and update this Management Plan • Ensure that the requirements of any statutory approvals, legislation and this Management Plan included in the contract documentation are implemented • Undertake audits of the contractor to verify compliance with any legislative requirements and this Management Plan
Contractor Project Manager (PM)	• Maintain a master copy of this Management Plan, a record of the completion of management measures, monitoring records and reports • Provide sufficient resources to ensure the effective implementation of this Management Plan • Participate in any audits initiated by Seqwater • Coordinate required monitoring • Provide relevant and timely information about construction activities that may impact on the amenity of stakeholders
Contractor Construction Manager (CM)	• Ensure that all noise and vibration monitoring equipment is procured/rented, installed, maintained, operated and results reported in accordance with this Management Plan • Report any incidents, non-compliances and complaints to the Contractor Project Manager • Participate in any investigations of complaints or non-conformances • Ensure all staff are trained/inducted to the Project
Contractor Environment and Sustainability Manager (ESM)	• Primary responsibility for implementation and compliance with this Management Plan, statutory approvals and legislation • Undertake regular inspections of work activities to ensure adherence to this Management Plan • Participate in toolbox talks as required to ensure staff are aware of key concerns associated with noise and vibration generating activities • Report any incidents, non-compliances and complaints to Seqwater • Lead any investigations of complaints or non-conformances and report any findings and corrective actions to Seqwater
Contractor Healthy and Safety Manager (HSM)	• Liaise with the ESM to minimise noise nuisance at neighbouring noise sensitive receptors, while ensuring that site safety measures, such as reversing alarms, meets safety standards

Role	Responsibility
Contractor Community & Stakeholder Manager (CSM)	• Ensure community members are appropriately notified of project work resulting in noise impacts, particularly for works required to be undertaken outside of standard hours • Manage the Project enquiries and responses • Determine if a complaint is valid or substantiated. In general, all complaints should be considered valid. Non-valid complaints could be complaints received about nuisance experienced by a receptor in relation to an activity not associated with the Project • Register and report community complaints and ensure adherence to the complaint's procedure
Contractor Supervisors (Sup)	• Ensure that this Management Plan requirements are communicated to all personnel and are being fully implemented on site • Undertake any rectifications as required by the Contractor Environment and Sustainability Manager (ESM)
All Project personnel (including Subcontractors)	• Comply with reasonable directions given by the Principal Contractor regarding environmental matters • Comply with the requirements of this Management Plan as relevant to the subcontracted works • Environmental incidents, non-conformances and near misses are to be reported to the Supervisors

4. Receiving Environment

4.1. Sensitive Receptors

The Project area is bordered to the north by Tewantin National Park and otherwise surrounded by a semi-rural residential area (Lake Macdonald suburb), see Figure 1 overleaf. The residential receptors along Lake Macdonald Drive near to the entrance to the site are identified as the most noise sensitive receptors in the immediate area. It is expected controlling construction noise such that an acceptable level of amenity is achieved will also satisfy amenity requirements at surrounding nature reserve areas such as the Tewantin National Park. The sensitive receptors in proximity to the Project include:

- Residential sensitive receptors as shown in Figure 1 overleaf
- The closest retail/commercial (Noosa Beverages) area located 1km from works which are separated by residential dwellings with a lower criteria level the retail area is not considered further in this assessment
- Recreation parks located within 1km of the Macdonald Dam's spillway are not considered noise sensitive in this instance of required remedial works and with other parks available at a further distance from the proposed

The abovementioned residential, non-residential, and commercial receivers potentially impacted by vibration emissions from the construction of the Project are the same as those listed above. In addition, vibration sensitive structures also include all buried services (utilities), Public Utility Plant (PUP) and any other assets potentially susceptible to vibration, such as swimming pools. All utilities include pipes or conduits, which run under/adjacent to Lake MacDonald Drive, with direct impacts from the proposed cofferdam piling works are detailed in Table 7.

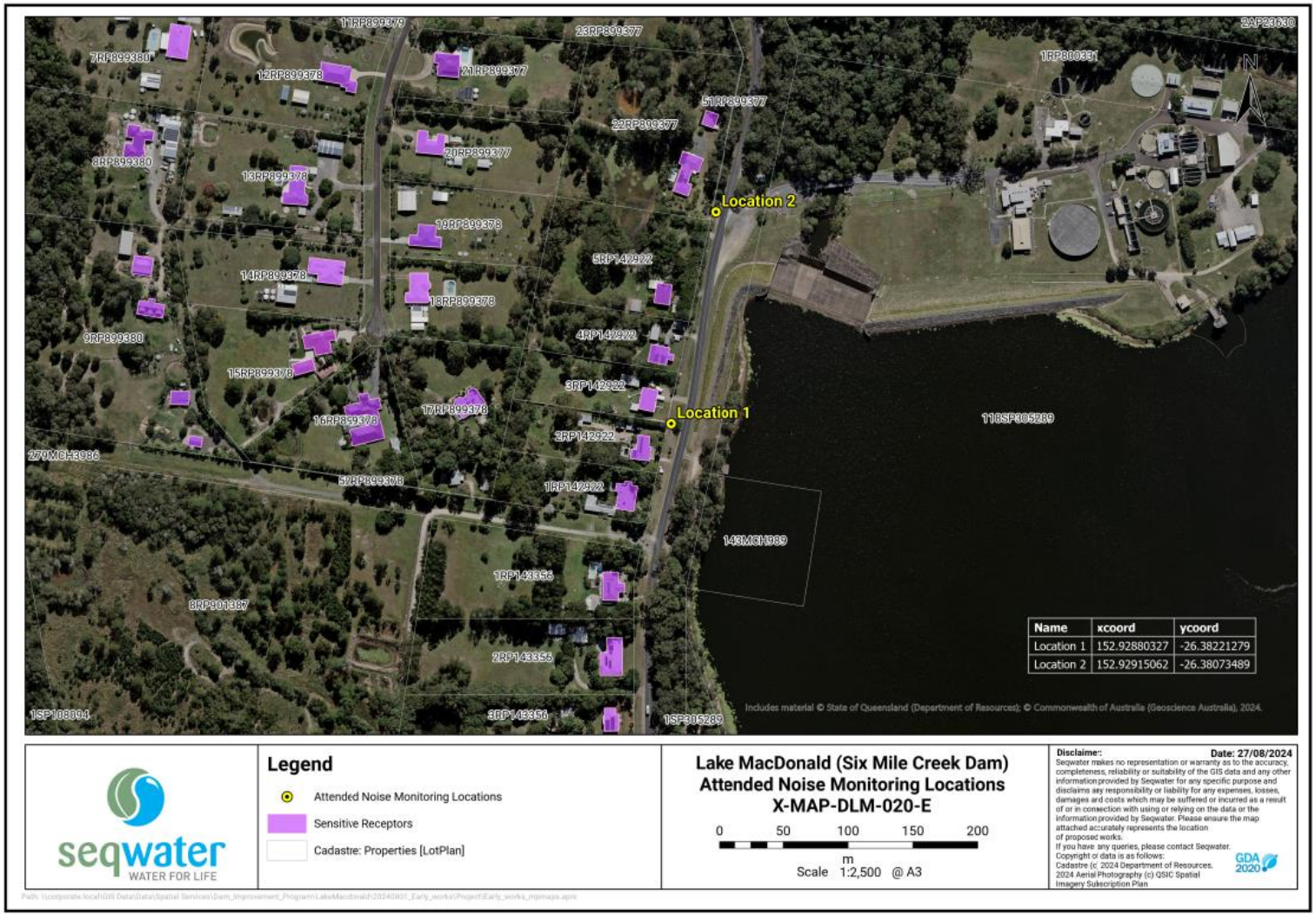


Figure 1: Sensitive Receivers and Location of Noise Monitoring During Construction Work

Table 7 Identified buried PUP

Utility	Asset Owner	Minimum Distance to Project (m)
Treated and Raw Water pipes	Seqwater	20 m
Data/communications	Telstra	30 m
Trunk and Reticulation main	Unity Water	20 m

A review of report Aboriginal Heritage Due Diligence Assessment Historical Heritage Assessment (Niche Environment and Heritage) dated November 2018 found several areas of local significance that are outside of the zone of influence for vibration, and no items of heritage significance to assess in the LMDIP area.

4.2. Ambient Acoustic Environment

Noise monitoring was undertaken from 29 May to 7 June 2018 at two residential properties located west of the existing dam wall to establish the ambient acoustic environment in the area and to provide context to the predicted construction emissions. The ascertained ambient baseline noise levels are presented in Appendix B.

The ambient noise levels collected in 2018 are not expected to have changed, as the area has undergone minimal changes and changes to traffic flows since that time are expected to be minimal.

5. Legislative and Other Compliance Requirements

5.1. CGCR Addressable Items

Details of the applicable CGCR addressable items and how these have been addressed in the Management Plan have been detailed below.

Table 8 CGCR Addressable items relevant to this Management Plan

CGCR Reference	Type	Addressable Items	How addressed in this Management Plan
Coordinator-General (CG) Conditions			
Appendix A. Imposed Conditions, Schedule 1, Condition 1 (c) Site Environmental Management Plan (SEMP)	Imposed Condition	The SEMP must include the following construction EMPs: (E) noise and vibration management plan	This Noise and Vibration Management Plan is a construction environmental plan and sub-plan of the Site Environmental Management Plan

5.2. Legislation

Details of relevant legislation applicable to this Management Plan have been detailed below.

Table 9 Other legislation applicable to this Management Plan

Legislation	How it Applies to this Management Plan
Environment Protection Act 1994 (EP Act)	Under the EP Act the Project must not cause an unreasonable nuisance to sensitive receptors. Noise and vibration, if not managed, may impact on the amenity of surrounding sensitive receptors and consequently be a nuisance. Seqwater has an obligation to uphold their general environmental duty, duty to notify, and duty to restore the environment under the EP Act to prevent environmental harm, nuisance and contamination occurring from project activities.
Environmental Protection (Noise) Policy 2019 (EPP Noise)	The EPP Noise defines the acoustic quality objectives (AQOs) that must be achieved to protect the amenity of surrounding receptors. This Management Plan has implemented measures to achieve the AQOs during the construction phase. During times where the AQOs cannot be achieved consultation and notification of affected receptors has been proposed.
Noosa Plan 2020	Under the *Noosa Plan 2020* the land around the Project is zoned as *Rural, Rural Residential* and *Environmental Management and Conservation.* Overall outcomes within these zones that apply to light management include: • *Environmental Management and Conservation Zone:* Development avoids and mitigates against adverse impacts on the values and processes within ecologically important areas • *Rural Zone*: Development is reflective of, and sensitively responds to, the environmental constraints of the land • *Rural Residential Zone*: The Rural residential zone provides a high level of amenity for permanent residents Noise management measures proposed in this plan have been developed to protect the outcomes of the relevant zones.

6. Potential Impacts

6.1. Construction Noise

The nature of the high-impact construction activities involved in this Project and the close proximity to residents that would not be accustomed to construction noise, mean certain noise exceedances are deemed to be unavoidable. However, there are many highly effective management strategies that will be deployed to minimise the impacts.

To predict the potential construction noise impacts a SoundPlan model was prepared by Virid IFC (2024). The summary of the noise scenarios modelled as has been provided in Table 10.

Table 10 Summary of Project activities construction scenarios modelled

Item[1]	Activity	Proposed Period[2]		
		Day	Evening	Night
CS1	Clearing and grubbing	Yes	No	No
CS2	Site gravel road construction	Yes	No	No
CS3a	Cofferdam vibration sheet piling	Yes	No	No
CS3b	Cofferdam impact sheet piling	Yes	No	No
CS3c	Cofferdam rock fill	Yes	Yes	No
CS4	Reservoir lowering	Yes	Yes	Yes
CS5a	Dam crest demolition & excavation	Yes	Yes	Yes
CS5b	Spillway demolition & excavation	Yes	Yes	Yes
CS6	Dam construction	Yes	No	No

[1] Item reference as defined by Seqwater
2 Day - Standard hours 7am to 6pm, Evening – Non-standard hours 6pm to 10pm, Night - Non-Standard hours 10pm to 7am.

The noise generated by each modelled construction scenario has been provided in Appendix C. The predicted modelled maximum sound level contours for each of the activities has been shown in Appendix A.

The number of modelled exceedances of the acoustic quality objectives (Table 2) is provided in Table 11.

Table 11 Summary table of the number of residential receptors that may have noise exceedances

Category	CS1	CS2	CS3a	CS3b	CS3c	CS4	CS5a	CS5b	CS6
Standard hours	4	0	0	0	0	0	7	0	0
Non-Standard hours	0	0	0	0	0	1	45	12	0

6.2. Construction Vibration

Modelling prepared by Virid IFC (2024) indicated that no receptors are likely to experience vibration in excess of the Human Comfort Guidelines (Table 3). Notwithstanding minimum working distances have been specified in Table 12 for plant and activities to achieve the vibration limits specified in Table 3 (Human Comfort) and Table 4 (Structural Damage Limits). The minimum working distances (Table 12) should be adopted to minimise the risk of

building damage and human comfort. Where two (2) or more plant items are required to operate within the same work area, the offset distances provided for each individual plant should be summed.

With application of the minimum offset distances between the proposed works and the receptors human comfort and structural damage are not anticipated to be generated by Project activities.

Table 12 Guideline working distances for vibration intensive plant (class) from sensitive receptors

Asset/Receptor	Asset Owner / Receptor Type	PPV Limit (mm/s)	Vib[1] Roller 1-2 T (very light) (m)	Vib Roller 2-4 tonnes (light) (m)	Vib Roller <18 tonnes (heavy) (m)	45 T excavator 900 kg hammer (m)	Sheet piling (m)
Dwellings and buildings of similar design and/or occupancy	Private	5	9	10	18	2	3
Pools	Private	5	9	10	18	2	3
Reinforced or framed structures and heavy commercial buildings	Private	10	6	7	13	1	2
Buried services - data and communications	Telstra	10	6	7	13	1	2
Buried services –pipes and mains	Unity Water and Seqwater	2	14	17	31	20	20
Residents –standard hours (upper limit)	Person	2	15	18	33	20	20
Residents –standard hours (lower limit)	Person	1	24	29	52	30	30

[1] Vib – Vibrating roller

6.3. Summary of General Potential Impacts – Noise and Vibration

A summary of the general potential impacts relevant to this Management Plan have been detailed in Table 13.

Table 13 Potential Impacts – Noise and Vibration

Item	Construction Activity	Potential Impact Number	Potential Impacts – Noise and Vibration
CS1	Clearing and grubbing	PI1	Noise nuisance and loss of amenity at nearby sensitive receptors during standard hours
		-	No vibration intensive plant to be used for this construction activity
		-	No impact to human comfort from vibration intensive plant (refer to Section 6.2)

Item	Construction Activity	Potential Impact Number	Potential Impacts – Noise and Vibration
CS2	Site gravel road construction	-	No modelled noise impacts – refer to Table 11
		PI2	Potential structural damage from vibration intensive plant
		-	No impact to human comfort from vibration intensive plant (refer to Section 6.2)
CS3a	Cofferdam vibration sheet piling	-	No modelled noise impacts – refer to Table 11
		PI2	Potential structural damage from vibration intensive plant
		-	No impact to human comfort from vibration intensive plant (refer to Section 6.2)
CS3b	Cofferdam impact sheet piling	-	No modelled noise impacts – refer to Table 11
		PI2	Potential structural damage from vibration intensive plant
		-	No impact to human comfort from vibration intensive plant (refer to Section 6.2)
CS3c	Cofferdam rock fill	-	No modelled noise impacts – refer to Table 11
		PI2	Potential structural damage from vibration intensive plant
		-	No impact to human comfort from vibration intensive plant (refer to Section 6.2)
CS4	Reservoir lowering	PI1	Noise nuisance and loss of amenity at nearby sensitive receptors during non-standard hours
		-	No vibration intensive plant to be used for this construction activity
		-	-No impact to human comfort from vibration intensive plant (refer to Section 6.2)
CS5a	Dam crest demolition & excavation	PI1	Noise nuisance and loss of amenity at nearby sensitive receptors during standard and non-standard hours
		PI2	Potential structural damage from vibration intensive plant
		-	No impact to human comfort from vibration intensive plant (refer to Section 6.2)

Item	Construction Activity	Potential Impact Number	Potential Impacts – Noise and Vibration
CS5b	Spillway demolition & excavation	PI1	Noise nuisance and loss of amenity at nearby sensitive receptors during non-standard hours
		PI2	Potential structural damage from vibration intensive plant
		-	No impact to human comfort from vibration intensive plant (refer to Section 6.2)
CS6	Dam construction	-	No modelled noise impacts – refer to Table 11
		PI2	Potential structural damage from vibration intensive plant
		-	No impact to human comfort from vibration intensive plant (refer to Section 6.2)

7. Management Measures

7.1. Activity Specific Management Measures

The noise and vibration management measures that will be adopted for the construction scenarios identified in Table 10, have been detailed in Table 14. The measures detailed below, must be applied to each activity in addition to the general management measures specified in Section 7.2.

Table 14 Activity specific management measures

Item	Nearest Sensitive Receptor	Minimum Distance to Receptor (m)	Residents where exceedance expected	Impact Duration	Noisy Activities	Actions	Staff Responsible	When
CS1	415 Lake Macdonald Drive	30	4	1 – 2 Days	• Chipper machine • Excavator • Tip truck • Chainsaws	Community consultation – this is a short duration (1-2 days) activity in proximity to sensitive receivers	CSM	Prior to commencing noise intensive activities
						Only use battery chainsaws unless not practical or safe to do so	Sup	Project Delivery
						Undertake chainsaw works during standard hours during when within 50 m of any noise sensitive receptors	Sup	Project Delivery
						Relocate the chipper work activities to an area of the site further away from sensitive receivers – e.g. borrow pit area	Sup	Workplace planning
						Operate plant efficiently to minimise the time the equipment is operational to undertake required works	Sup	Project Delivery
						Turn chipper and chain saws off when not in use.	Sup	Project Delivery
CS2	62 Highland Drive Lake Macdonald	77	0	5 days	• 12 T single drum roller (low vib) • Dozer • Wheeled loader • Grader • Trucks (incl water trucks)	Community consultation with sensitive receivers with adequate notice of upcoming activity	CSM	Prior to commencing noise intensive activities
						Operate plant efficiently to minimise the time the equipment is operational to undertake required works.	Sup	Project Delivery

Item	Nearest Sensitive Receptor	Minimum Distance to Receptor (m)	Residents where exceedance expected	Impact Duration	Noisy Activities	Actions	Staff Responsible	When
					• Skid steer • Utes			
CS3 (a,b,c)	415 Lake Macdonald Drive	28	0	154 days – 7AM to 10PM / Mon to Sun	• 40T Crane track and Vibrodriver (30HV) • 40T Crane track and Hydrohammer (S-40) • 20T rigid dump trucks • 30T Articulated haul truck • Skid steer • 45T excavator • 12T vibratory roller	Community consultation with sensitive receivers with adequate notice of upcoming activity	CSM	Prior to commencing noise intensive activities
						Only use impact piling where vibratory piling is not suitable	Sup	Project Delivery
						Providing periods of respite between high noise (i.e. hammering) activities	Sup	Project Delivery
						Operate plant efficiently to minimise the time the equipment is operational undertaking required works	Sup	Project Delivery
						Choose the quietest sheet piling equipment that can supply the required power load with auto start so it only runs when required.	Sup	Project Delivery
						Use acoustic curtains around impact hammer when impact piling during non-standard hours	Eng / Sup	Project Delivery
CS4	415 Lake Macdonald Drive	47	1	43 days – 24 hrs / 7 days	Ten (10) x 12” diesel pumps	Community consultation with sensitive receivers with adequate notice of upcoming activity	CSM	Prior to commencing noise intensive activities
						Locate a temporary acoustic fence on the dam wall adjacent to Macdonald Drive	Sup	Project Delivery
						Locate pumps to locations as far a reasonably practicable from the nearest sensitive receptor	Sup	Project Delivery
						Throttle-back pumps during evening and night (if schedule permits)	Sup	Project Delivery
						Use only syphon hoses during night periods	Sup	Project Delivery
CS5a	419 Lake Macdonald Drive	28	45	12 days – 24 hrs / 7 days	• Skid steer • 45t excavator with Hydraulic hammer • Skid steer • Hand tools (battery) • Concrete saw • Generator • Stockpile • Haul route	Community consultation with sensitive receivers with adequate notice of upcoming activity	CSM	Prior to commencing noise intensive activities
						Hydraulic hammering and concrete sawing activities will only occur during standard hours	Sup	Project Delivery
						Complete the use of the concrete demolition, using the hydraulic hammer, of existing spillway as quickly as practicable	Sup	Project Delivery
						Use acoustic curtains around hammer when impact breakers operating during non-standard hours	Sup	Project Delivery
						Locate generator so the site office blocks view to residential properties	Sup	Project Delivery

Item	Nearest Sensitive Receptor	Minimum Distance to Receptor (m)	Residents where exceedance expected	Impact Duration	Noisy Activities	Actions	Staff Responsible	When
CS5b	419 Lake Macdonald Drive	28	12	25 days – 24 hrs / 7 days	• 40T Crane track • 45t excavator (with hydraulic hammer) • 30T haul truck x4	Community consultation with sensitive receivers with adequate notice of upcoming activity	CSM	Prior to commencing noise intensive activities
						Hydraulic hammering and concrete sawing activities will only occur during standard hours	Sup	Project Delivery
						Complete the use of the concrete demolition, using the hydraulic hammer, of existing spillway as quickly as practicable	Sup	Project Delivery
						Use acoustic curtains around hammer when impact breakers operating during non-standard hours	Sup	Project Delivery
						Locate generator so the site office blocks view to residential properties	Sup	Project Delivery
CS6	419 Lake Macdonald Drive	28	0	3.5 years – 24 hrs / 7 days	• Concrete batch plant • Tower crane (x2) • Secant bored piling • Concrete agitator (x4) • Concrete vibrators (x3) • Elevated work platform • Concrete saw • 10T vibratory roller • Haul route • Hand tools • Skid steer	Community consultation with sensitive receivers with adequate notice of upcoming activity	CSM	Prior to commencing noise intensive activities
						Piling activities will only occur during standard hours	Sup	Project Delivery
						Locate generator and other equipment so the site dam wall blocks view to residential properties	Sup	Project Delivery

7.2. General Management Measures

The management measures that will be implemented to minimise the potential for impacts associated with noise have been detailed in Table 15. In general, construction works will be carried out in accordance with the *Australian Standard 2436-2010, Guide to Noise Control on Construction, Maintenance and Demolition Sites* and equipment will be designed and operated to comply with the *Environmental Protection (Noise) Policy 2019*.

Table 15 Management measures

No.	Hold Point	Actions	Related Potential Impact	Staff Responsible	When
MM1	Y	Community consultation with sensitive receivers will be undertaken prior to commencing the following noise intensive activities: • Pump operations during night time • Sheet piling of the coffferdam • Demolition of the existing dam structure • Clearing and grubbing and gravel road construction on the east and west embankment • Mobilisation and demobilisation of heavy plant and equipment • Any activity that will be undertaken outside of standard construction hours	PI1 PI2	CSM	Prior to commencing noise intensive activities
MM2	Y	Seqwater Superintendent to be notified minimum 7 business days in advance if any noise intensive activities are to be undertaken.	PI1	ESM	Prior to commencing noise intensive activities
MM3		Appropriate selection of construction processes/methods and equipment that minimises the generation of noise would be further considered during the development of the Project schedule.	PI1	PM / CM	Project planning
MM4		Where reversing alarms are required for mobile equipment such as dozers, scrapers, cranes, graders, excavators, trucks, loaders etc., their acoustic range should be limited to the immediate danger area. Traditional reverse beepers must not be used on site. Reversing beepers must be low frequency alarms. The requirements of Occupational Health and Safety Regulations must be adhered to	PI1	Eng / HSM	Prior to mobilisation

No.	Hold Point	Actions	Related Potential Impact	Staff Responsible	When
MM5	Y	All noise attenuation required to protect the amenity of sensitive receptors must be installed prior to commencement of construction within a specific area.	PI1	PM	Workplace planning
MM6	Y	Prior to commencement of works, undertake dilapidation surveys at the following properties: • 389 Lake Macdonald Drive • 395 Lake Macdonald Drive • 403 Lake Macdonald Drive • 407 Lake Macdonald Drive • 411 Lake Macdonald Drive • 415 Lake Macdonald Drive • 419 Lake Macdonald Drive Undertake post construction dilapidation surveys at the above-mentioned properties upon completion of the Project	PI2	ESM / PM	Prior to works commencing / post completion of works
MM7		The following measures will be implemented when undertaking construction works on the east and west embankment: • Use of battery-operated chainsaws where possible • Undertake chainsaw works during non-noise sensitive time periods for those properties which are predicted to exceed the criteria • Locate chipper work activities to an area of the site further away from sensitive receivers • Provide a temporary noise fence to block the noise between the chipper and noise sensitive receptors • Attended noise monitoring only required if a noise complaint is received • Turn chipper and chain saws off when not in use • Minimise high noise plant/equipment operations • Operate plant efficiently to minimise the time the equipment is operational to undertake required works	PI1	Sup	Project Delivery – Construction on the east and west embankments

No.	Hold Point	Actions	Related Potential Impact	Staff Responsible	When
		• Generator required to provide power to the concrete batching plan is located to avoid impacts to sensitive receptors			
MM8		Trucks must not use engine brakes on the Project	PI1	Truck drivers	Project Delivery
MM9		Where vibratory plant is being utilised near to sensitive receptors, judicious selection of plant and equipment will be necessary. Vibratory rollers within the LMDIP must operate at the low amplitude, high frequency setting to ensure minimal vibratory impacts and be sized as recommended above.	PI2	Eng / Sup	Project Delivery – Use of Vibratory Plant
MM10		Avoid turning the vibration mode on/off when stationary or moving too slowly, or when close to buildings or underground assets	PI2	Eng / Sup	Project Delivery – Use of Vibratory Plant
MM11		Utilise low vibratory compaction methods within the minimum buffer distances (as specified in Table 12) to underground assets	PI2	Eng / Sup	Project Delivery – Use of Vibratory Plant
MM12		All plant and equipment will be maintained in good condition and in accordance with the manufacturers specifications.	PI1	Sup	Project delivery
MM13		Any unusually noisy equipment will be tagged out of service and maintenance undertaken to rectify the cause of the noise. If the source of the noise cannot be repaired, then equipment will be demobilised from the Project	PI1	Sup	Project delivery
MM14		Adopt the use of temporary acoustic screens that will break the line-of-site of the construction works towards noise sensitive locations. Temporary acoustic screens can include: • Purpose built barriers • Materials stockpile • Site sheds, buildings or other structures • Natural topographical barriers	PI	Sup	Project delivery
MM15		Metal surfaces subject to impacts from heavy objects (such as rock dropping into empty truck trays, or metal grates on road ramps etc.) will be lined with rubber impact protection to minimise impact noise.	PI1	Sup	Project delivery

No.	Hold Point	Actions	Related Potential Impact	Staff Responsible	When
MM16		When using pneumatic equipment, select silenced compressors or use quieter hydraulic equipment.	PI1	Eng	Project Delivery
MM17		Internal combustion engines will be fitted with a suitable muffler in good repair.	PI1	Eng	Project Delivery
MM18		Plant with the lowest noise rating that meets the requirement of the task will be used.	PI1	Eng	Project Delivery
MM19		Maintain a site activity log, recording the type of activities taking place during various times of the day to assist with the retrospective investigation of community complaints relating to noise or vibration complaints.	PI1	Sup	Project Delivery
MM20		All deliveries will occur during standard construction hours (Table 5). Loading and unloading carried out as far as practicable away from sensitive receptors.	PI1	Sup	Project Delivery
MM21		Works outside of standard construction hours (Table 5), must: • Be endorsed in writing by Seqwater and the relevant regulatory agency where applicable (e.g. Department of Transport and Main Roads, Noosa Shire Council, Department of Environment, Tourism, Science and Innovation (DETSI) etc.) • Have been subject to appropriate community consultation prior to works	PI1	ESM / CSM	Project Delivery
MM22		Entry and departure of heavy plant and equipment to and from the site are restricted to the standard construction hours.	PI1	Eng / Sup	Mobilisation / Demobilisation
MM23	Y	All vehicles, plant and equipment will undergo a Plant Hazard Assessment prior to gaining access to the site. Plant with the lowest noise rating that meets the requirement of the task shall be used. For works in close proximity to sensitive receptors, where practicable, use electric motors in preference to combustion motors. Where enclosures are fitted to equipment, ensure doors and seals are in good working order and that doors can be closed properly against the seals.	PI1	HSM / Eng	Project Delivery
MM24		Vehicles, plant and equipment will be regularly inspected and maintained to ensure optimal operation. Daily pre-start inspections and plant/vehicle logbooks	PI1	All personnel	Project Delivery

No.	Hold Point	Actions	Related Potential Impact	Staff Responsible	When
		will be used to record and determine inspection and maintenance suitability and schedules.			
MM25		All plant and equipment (including trucks) are to minimise any idling and shall be turned off (or throttled down if appropriate) when not in use.	PI1	All personnel	Project Delivery
MM26		Equipment with directional noise characteristics (emits noise strongly in a particular direction) are to be orientated so that the noise is directed away from the sensitive receptors.	PI1	All personnel	Project Delivery
MM27		Acoustic enclosures or localised noise screens could be incorporated and maintained around fixed plant or over individual pieces of equipment e.g. generator for the concrete batching plant .	PI1	Sup	Project Delivery
MM28		The use of noisy hand tools such as grinders, impact wrenches and hammers are to be used as far away as practicable from sensitive receptors. Temporary barrier screens will be erected where necessary.	PI1	All personnel	Project Delivery
MM29		Reduce the potential for impacts from construction traffic (particularly on Lake Macdonald Drive) by: • Undertaking regular site road maintenance (and inspections) to minimise impact noises from trucks travelling over irregularities in the road surface (such as potholes, washouts or ruts) • Limiting vehicle speeds in critical areas both on and off site • Access via the designated access point is maintained • Allowing for one-way traffic flow through the site to minimise the use of reversing alarms as much as practicable and minimise traffic delays • Ensuring trucks are fully loaded so that the volume of each delivery is maximised. Planning deliveries to minimise the potential for trucks to queue on Lake Macdonald Drive	PI1	Sup	Project Delivery
MM30		Positioning loading and unloading points away from sensitive and critical receptors. Minimise drop height of materials when transferring (for example, dumping fill)	PI1	Sup	Project Delivery

8. Hold Points

The hold points that will be adopted for noise management have been detailed in Table 16.

Table 16 Project hold points

Hold point number	Related management measure	What	When does it occur	Staff responsible	Construction activities restricted until Hold Point completed
1	MM1	Community consultation with sensitive receptors	1 day prior to noise intensive activities commencing or non-standard construction hours	CSM	Commencing noise intensive activities or any activities outside of standard construction hours
2	MM2	Seqwater notification	7 business days prior to noise intensive activities commencing or non-standard construction hours	ESM	Commencing noise intensive activities or any activities outside of standard construction hours
3	MM5	Plan noise attenuation required to protect any sensitive receptors	Prior to mobilisation	PM	Plant mobilisation
4	MM6	Dilapidation surveys	Prior to works commencing / post completion of works	ESM / PM	Vibration generating activities (e.g. piling, demolition etc.)
5	MM23	Plant Hazard Assessment	Prior to mobilisation	All personnel	Plant mobilisation

9. Monitoring

To verify this Management Plan is achieving its performance measures, the following monitoring program (Table 17) has been proposed.

Table 17 Monitoring program

No.	What	Who	When
1	Monitoring of the meteorological conditions	ESM	On-going
2	Ongoing unattended noise monitoring at the 2 locations (attended locations) shown on Figure 1 will be undertaken. Noise logging will be conducted in accordance with procedures outlined in *Australian Standard Australian Standard AS1055-1997 – Acoustics – Description and measurement of environmental noise* and the *Department of Environment & Science Noise Measurement Manual* (DEHP 2013).	ESM	2 weeks prior to any construction activity and continue until Practical Completion has been achieved

No.	What	Who	When
	The following should be recorded as part of the unattended noise monitoring program: • 1 hour interval measurement periods • Microphone placed 1 m from the most exposed façade or where placement at the façade is not possible, then place the microphone between the dwelling and the construction site at a location more than 3.5 m from any reflecting structures (such as the dwelling and sheds). • SMS or email alerts when excessively high noise levels are substantiated • Remote access capable of continuously uploading the measurement results to a remote server • Minimum data to include overall results plus statistics: L_{Aeq}, L_{A90}, L_{A10}, L_{A1}, L_{Amax} • All measurements should be conducted using the 'A-weighting' filter and 'Fast' response. All items of acoustic instrumentation employed should be designed to comply with Australian Standard IEC 61672.1-2004 Electroacoustics – Sound level meters (AS IEC 61672) and have current calibration certificates • Units are recommended to be solar or otherwise continuously powered and robust against weather and other environmental conditions • Audio recordings are enabled on the noise monitoring devices such that the source(s) causing noise exceedances can be identified • Appropriate local weather data will need to be recorded for the same time periods and record at least wind speed, wind direction and rainfall Results will reviewed monthly and compared with construction activities undertaken during the period and the AQOs outlined in Section 2.		
3	Undertake attended noise monitoring at a location to be determined following receipt of a complaint or identification of an exceedance. Precise monitoring locations must be determined in consultation with an appropriately qualified person (AQP). Noise logging will be conducted in accordance with procedures outlined in *Australian Standard AS1055-1997 – Acoustics – Description and measurement of environmental noise* and the *Department of Environment & Science Noise Measurement Manual* (DEHP 2013) The following should be recorded as part of the attended noise monitoring program: • 1 hour interval measurement periods • Microphone placed 1 m from the most exposed façade or where placement at the façade is not possible, then place the microphone between the dwelling and the construction site at a location more than 3.5 m from any reflecting structures (such as the dwelling and sheds) • Minimum data to include overall results plus statistics: L_{Aeq}, L_{A90}, L_{A10}, L_{A1}, L_{Amax} • All measurements should be conducted using the 'A-weighting' filter and 'Fast' response. All items of acoustic instrumentation employed should be designed to comply with *Australian Standard*	ESM	For a period of 1 week, in response to a valid community complaint regarding construction noise or where an exceedance is noted as part of the unattended noise monitoring

No.	What	Who	When
	IEC 61672.1-2004 Electroacoustics – Sound level meters (AS IEC 61672) and have current calibration certificates • Units are recommended to be solar or otherwise continuously powered and robust against weather and other environmental conditions • Audio recordings are enabled on the noise monitoring devices such that the source(s) causing noise exceedances can be identified • Extraneous noise (such as nearby traffic not associated with the project) must be excluded during the analysis of the attended noise measurements • Appropriate local weather data will need to be recorded for the same time periods and record at least wind speed, wind direction and rainfall Results will reviewed at the end of the monitoring period and compared with construction activities undertaken during the period and the AQOs outlined in Section 2.		
4	Unattended vibration monitoring at a location deemed suitable to monitor vibration impacts. Precise monitoring locations must be determined in consultation with an AQP. The vibration monitoring will be undertaken as follows: • A vibration monitoring device is to be installed inside or outside of the nearest building to the construction works. The monitoring device must send an alarm where vibration levels exceed 0.9 mm/s peak particle velocity (PPV) • The alarm shall include automated SMS to the Supervisor and Administrator • All vibration measurements shall be conducted using laboratory calibrated equipment in accordance with BS 7385-2-1993 and BS 6955-0:1988 • The vibration sensor must be located inside a building on the foundation or outside on the ground of the nearest dwelling to the construction work. The sensor must be well secured to the foundation or to the ground. The sensor should be placed away from other vibration generating sources such as adjacent to typical walking paths (inside or outside) or next to a driveway • The vibration monitors must have remote access capable of continuously uploading the measurement results to a remote server • The vibration monitors must take 5-to-15-minute interval measurement periods • Units will be solar or otherwise continuously powered and robust against weather and other environmental conditions Results will reviewed at the end of the monitoring period and compared with the vibration limits outlined in Section 2.		Vibration monitoring shall be conducted for a minimum of 1 week during construction if complaints are received, or unforeseen activities are required that have an associated vibration risk.
5	General observations for the daily management of noise and vibration controls shall be documented in site diaries.	ESM	Daily during Project Delivery
6	Regular inspection of noise and vibration controls shall be undertaken using the Weekly Environmental Management Inspection Checklist.	ESM	Weekly
7	Effectiveness of noise and vibration controls shall be regularly reviewed for adequacy having regard for changing circumstances.	ESM	Regularly during Project Delivery

No.	What	Who	When
8	Quarterly (internal) and annual (external) audits of this Management Plan will be undertaken as part of the SEMP auditing process	ESM	Quarterly/Annual during Project Delivery

10. Corrective Actions

Corrective actions that will be implemented in the event that a performance measure has not been achieved, have been detailed in Table 18.

Table 18 Corrective action plan

Issue / Event	Suggested Corrective Actions
Non-conformance with this Management Plan	• Notify the supervisor responsible for the area of non-conformance • ESM will provide the supervisor instructions to resolve the non-conformance • ESM will check the non-conformance is rectified 24 hours after the instruction was given
Community concern received relating to noise and/or vibration	• All details and any subsequent correspondence with the relevant community member will be logged • The CSM must reach out to the community member and determine the specifics of the complaint • Conduct attended monitoring and conduct site inspection to determine if any particular item of activity is likely to be the subject of the concern or complaint • Determine whether any corrective actions (e.g. further shielding, relocation or changing of equipment/activity) can be adopted to mitigate impacts in the direction of the community member • Implement corrective actions identified prior to commencement of the works • The CSM will notify the community member and advise of the corrective actions taken within 24 hours of the initial notification of the concern or complaint • The CSM will follow up with the community member 48 hours after the initial notification to seek feedback on the appropriateness of the corrective actions • If corrective actions **have not** rectified the issue for the community member, determine whether further actions can be adopted and continue to liaise with the community member until the issue has been resolved • If corrective actions **are** suitable, document the actions in an update of this Management Plan
Project vibration target is exceeded	• If the vibration targets are exceeded during Construction, works are to immediately cease in the area • Works shall not recommence until the incident is investigated by an AQP, appropriate mitigation measures implemented and approval for works to recommence received from Seqwater • Continue to review the vibration data each day. Where the recorded vibration levels exceed 1 mm/s works must immediately cease in the area • Review construction methods and identify if alternative measures can be adopted
Project AQOs are exceeded	• Review the noise data each day. Where the recorded noise levels exceed the noise goal investigate the cause of the exceedance (preferably by listening to the audio file).

Issue / Event	Suggested Corrective Actions
	• If exceedance is due to extraneous noise or activity (animal, lawnmower, traffic noise), no further investigation is required, and the cause of the exceedance is registered in the noise monitoring log. • Where the exceedance is due to project activity, investigate if noise mitigation measures have been implemented as outlined in Section 7. Where mitigation measures have not been implemented, the CM must implement appropriate measures identified in Section 7 and provide additional training to personnel. The ESM must confirm if the mitigation measures have been effective by monitoring noise levels at the restart of the construction activity. • Where mitigation measures have been implemented in conformance with this plan, investigate further potential mitigation measures (e.g. noise attenuation barriers, amending construction hours etc.) to be implemented to minimise potential impacts. The ESM must confirm if further mitigation measures have been effective by monitoring noise levels at the restart of the construction activity. • Where further source noise controls or mitigation in the sound transmission path are not practicable or ineffective in further controlling noise levels, controls at the receiver will be investigated in consultation with an AQP. • Implement off-site mitigations (Section 10.1) as a further noise mitigation measure where there is potential for clearing, impact hammer piling and rock breaking (specifically during use of tree mulchers, impact hammer piling rig and rock breakers) to impact sensitive receptors and other noise management measures identified in the plan cannot be implemented or are not effective
Creation of excessive vehicle noise emissions	• Repair or undertake maintenance on vehicles where necessary • Remove non-compliant vehicles from operation where repair or maintenance is not practicable • Restrict vehicle hours of operation when working in the vicinity of sensitive receivers

10.1. Off-Site Mitigations

Despite implementing all practical and reasonable efforts to mitigate noise emissions from the Project, it is acknowledged that some activities may exceed Project targets. In such cases the CSM will liaise closely with local stakeholders to offer commensurate respite mitigation. The contractor must minimise noise and vibration impacts and keep in touch with neighbouring noise and vibration sensitive receptors about upcoming works.

Where exceedances are deemed to be temporarily unavoidable, mitigation treatments will be tailored to suit impacted individuals on a case-by-case basis and include a range of measures as detailed in the following sections.

10.1.1. Noise Reducing Measures

Items such as noise cancelling headphones and ear plugs, will be offered to residents upon request and considered on a case-by-case basis subject to predicted noise levels, duration and time period of construction works.

10.1.2. Respite offers

The Project may offer respite offers where residents are subjected to lengthy periods of noise or vibration from an ongoing activity. The offer could comprise of entertainment, relaxation vouchers or similar offers designed to provide residents with a short break from impact of construction activity outside of their home.

10.1.3. Temporary Accommodation

Where high noise levels from construction occur at night and there are no feasible and reasonable ways of reducing noise levels, and the previous respite period measures are not sufficient, the Project may offer alternative accommodation. Temporary accommodation will be considered only if the relevant criteria for noise are predicted to be exceeded for more than 2 consecutive nights and the following factors:

- The resident's proximity to the works
- The nature of the works and its impacts
- The duration of the works
- Individual circumstances such as special needs associated with health conditions
- What relief has already been provided by Seqwater

10.1.4. Acoustic Treatment

Residents subject to prolonged and regular periods of night hour construction noise, may be assessed for acoustic mitigation of noise sensitive rooms, with treatment determined on a case-by-case basis, subject to predicted noise levels, duration and time period of construction works.

Acoustic treatment will be subject to additional temporal threshold requirements.

11. Reporting

Reporting that will be undertaken in accordance with this Management Plan has been detailed in Table 19

Table 19 Reporting plan

No.	Reporting Required	By Whom	By When	To Whom
1	Details of field observations shall be reported via the Weekly Environmental Inspection Checklist, and communicated to staff during pre-starts, toolbox and team meetings as appropriate.	ESM	Project Delivery	All personnel
2	Result of all monitoring undertaken during the reporting period.	ESM	Monthly	Seqwater
3	All complaints / incidents regarding noise and vibration shall be reported immediately. Record all noise, vibration complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. This log will be available to regulatory authorities upon request.	All personnel / CSM	Within 1 hour of an incident / complaint	ESM / PM / Seqwater

No.	Reporting Required	By Whom	By When	To Whom
4	Results of complaint investigations and corrective actions	CSM / ESM	Within 72 hours of the complaint	Complainant / PM
5	Impacted residents are notified of the planned duration and extent of noise intensive activities or works during non-standard times	CSM	1 day prior to event	Impacted residents
6	Monthly report to Seqwater that includes details of noise monitoring results, audits, non-compliances, complaints, and incidents.	ESM	Monthly	Seqwater
7	Quarterly report to the CG as per the requirements of schedule 2, condition 2. Report will include: • An evaluation of compliance with the SEMP • Monitoring data required by the Imposed Conditions included in Schedule 2 of the CGCR (2025) for the period and an interpretation of the results • Details of any environmental incident during the reporting period, including a description of the incident, resulting effects, corrective actions (including site remediation activities), revised activity practices to prevent a recurrence, responsibility and timing The reports must be provided to the Coordinator-General and also be made available on the Project website within 20 business days of the end of the three-month period to which the report relates and continue to be available on the project website for the duration of the Project	Seqwater	Quarterly	Coordinator-General

12. Training

Site inductions will include the following specific components for noise and vibration management:

- The close proximity of noise and vibration sensitive properties on Lake Macdonald Drive
- Lists plant items and construction activities that potentially could cause noise and vibration annoyance
- Potential impacts of excessive noise & vibration on sensitive receivers and the importance of managing noise, and vibration at the source
- Noise, and/or vibration monitoring that will be carried out during the Project
- Approved Project working hours

The following additional information will be supplied during toolboxes/pre-starts to maximise the awareness of noise and vibration impacts:

- Unnecessary or overuse of horns and engine idling
- Avoiding the use of radios or stereos outdoors where neighbours may be affected

- Minimising shouting and swearing
- Use of compression air brakes adjacent to sensitive areas
- Efficient material handling procedures to reduce unnecessary loud banging sounds

13. Review and Continual Improvement

This Management Plan shall be reviewed within the first 3 months of site mobilisation to ensure the plan is fit for purpose and any identified incidents, issues or hazards are addressed in the Management Plan accordingly. Follow up reviews are to be undertaken annually during construction. This Management Plan shall be reviewed, out of the normal cycle, in the event of a legislative breach, incident, community complaint or when a new hazard or impact has been discovered.

Appendix A: Noise Contour Maps

Source: Virid IFC, 2024. *Lake Macdonald Dam Improvement Project Construction Noise and Vibration Impact Assessment*. Prepared for Seqwater. Brisbane, Queensland

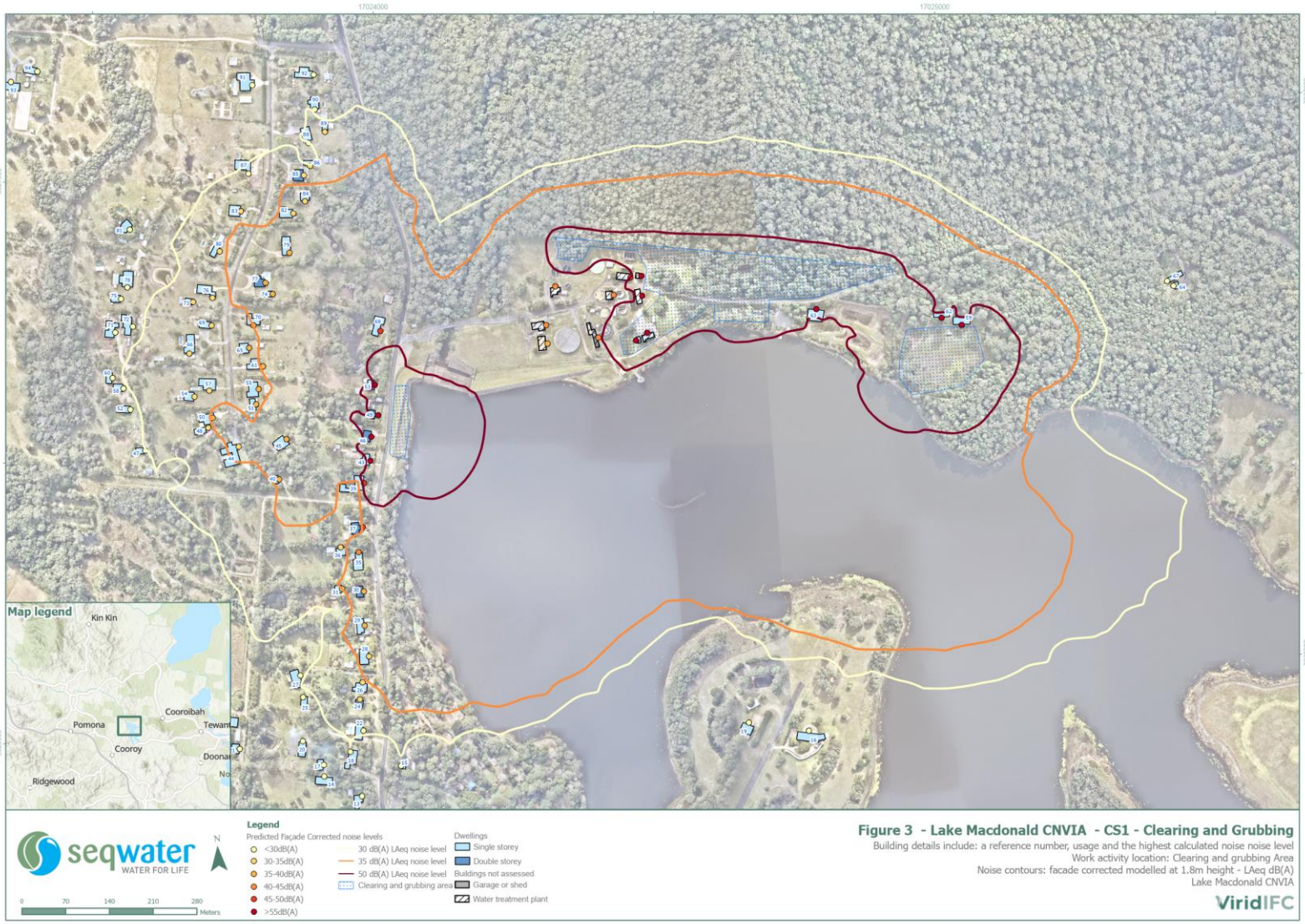


Figure 3 - Lake Macdonald CNVIA - CS1 - Clearing and Grubbing
Building details include: a reference number, usage and the highest calculated noise noise level
Work activity location: Clearing and grubbing Area
Noise contours: facade corrected modelled at 1.8m height - LAeq dB(A)
Lake Macdonald CNVIA
ViridIFC

Figure 5 A - Lake Macdonald CNVIA - CS3A - Cofferdam vibratory sheet piling
Building details include: a reference number, usage and the highest calculated noise noise level
Work activity location: Vibratory piling Location & Lorry Route
Noise contours: facade corrected modelled at 1.8m height - LAeq dB(A)
Lake Macdonald CNVIA

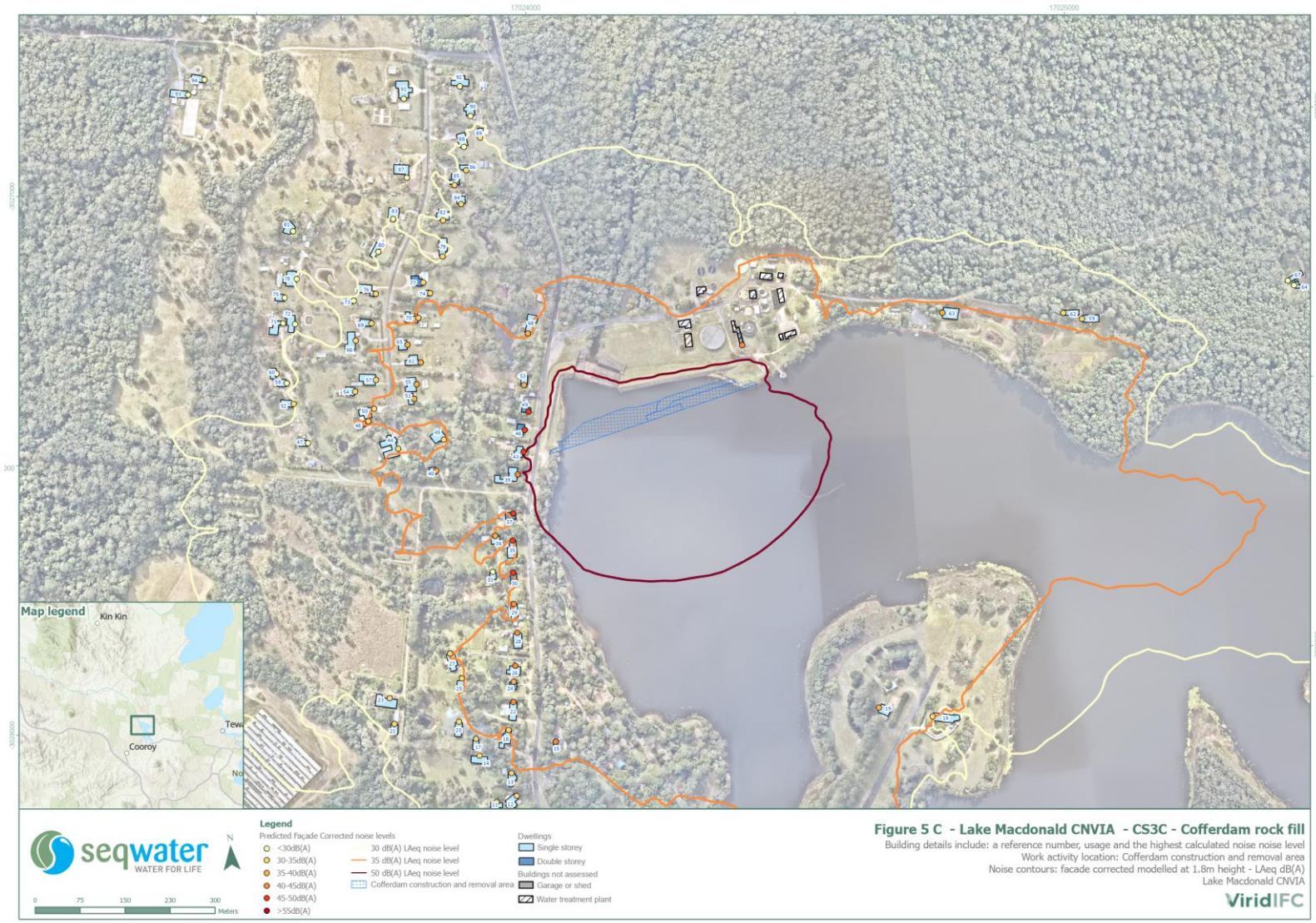
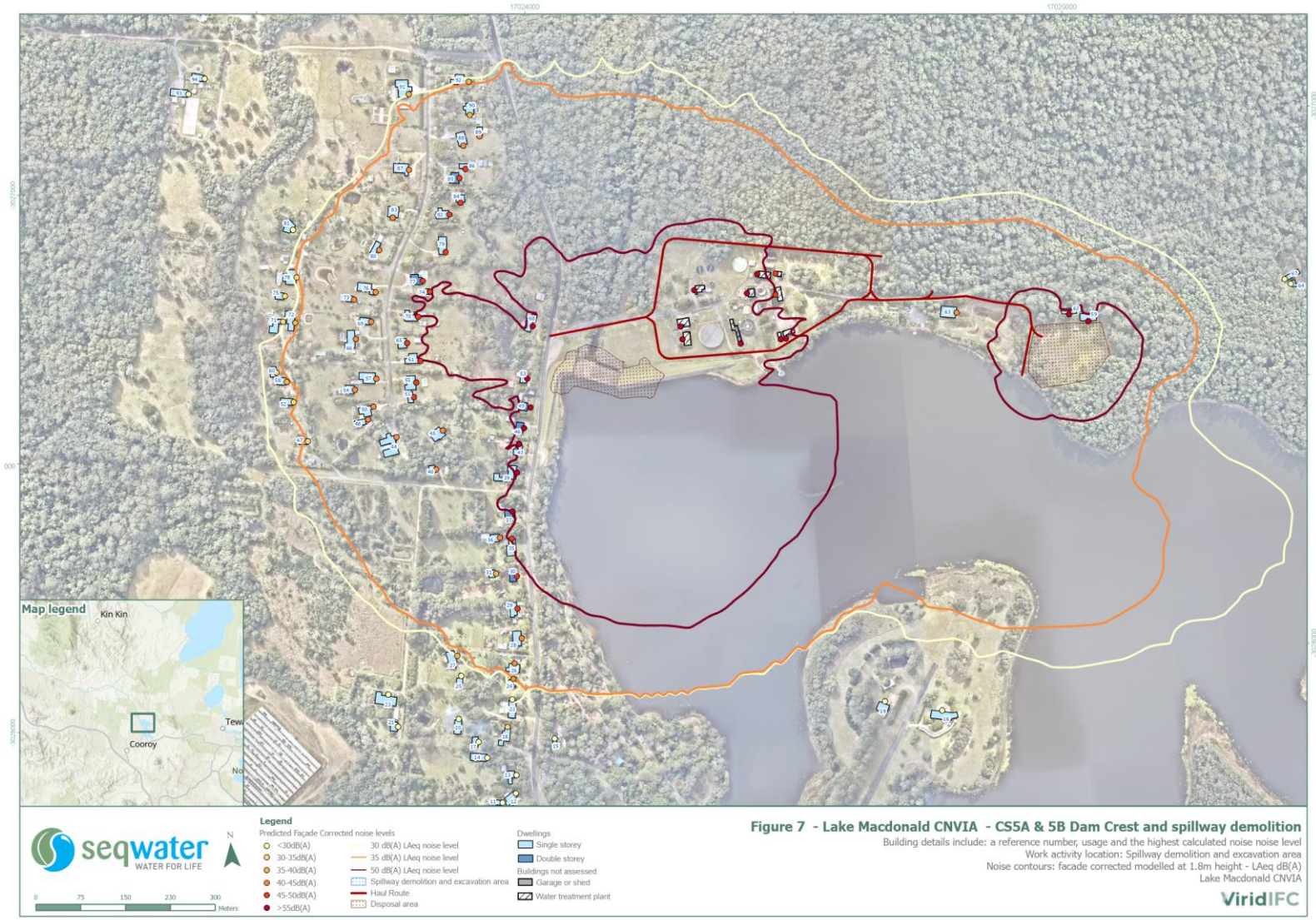


Figure 5 C - Lake Macdonald CNVIA - CS3C - Cofferdam rock fill
Building details include: a reference number, usage and the highest calculated noise noise level
Work activity location: Cofferdam construction and removal area
Noise contours: facade corrected modelled at 1.8m height - LAeq dB(A)
Lake Macdonald CNVIA
ViridIFC



Appendix B: Baseline Noise Levels

A summary of baseline ambient noise levels is presented in Table 20

Table 20 Summary of measured baseline noise levels

Parameter	Period	Average Noise Levels (dBA)	
		43 Highland Drive	**407 Lake Macdonald Drive**
L_{A1}	Daytime (7am-6pm)	63	52
	Evening (6pm-10pm)	59	47
	Night (10pm-7am)	54	43
L_{A10}	Daytime (7am-6pm)	56	46
	Evening (6pm-10pm)	46	42
	Night (10pm-7am)	45	36
Rating Background Level (RBL) [1]	Daytime (7am-6pm)	40	34
	Evening (6pm-10pm)	40	30
	Night (10pm-7am)	40	28
L_{Aeq}	Daytime (7am-6pm)	55	47
	Evening (6pm-10pm)	47	47
	Night (10pm-7am)	49	40

Note 1: The RBL is the median of the 90th percentile of the daily background (L_{A90}) noise levels in each assessment period (day, evening and night) over the duration of the monitoring period

Operator attended noise measurements were undertaken at the noise logger locations. All significant noise sources were identified during the operator attended measurements and therefore the attended noise measurements allowed for the characterisation of the existing noise environment. The results of the operator attended noise measurement are shown in Table 21.

Table 21 Attended noise measurement results

Location	Date & Time	Noise descriptor				Description of Acoustic Environment
		L_{A1}	L_{A10}	L_{A90}	L_{Aeq}	
43 Highland Drive	29/05/18 1:16 pm	62	54	46	51	Noise generated by water rushing over the dam spillway was dominant (45 dBA SPL). Road traffic noise audible during vehicle passby on Lake Macdonald Drive (52 to 63 dBA SPL). Insect noise clearly audible. Intermittent bird noise audible at times. No mechanical plant noise from the water treatment plant was audible
407 Lake Macdonald Drive	29/05/18 1:50 pm	51	45	35	42	Insect noise was dominant (centred around 4KHz). Road traffic noise audible during vehicle passby on Lake Macdonald Drive (44 to 46 dBA SPL). Intermittent bird noise and dog bark audible at times. Wind generated noise in trees audible at times. No mechanical plant noise from the water treatment plant was audible

Appendix C: Noise Sources

Table 22 presents the construction equipment list, sound power levels, and applicable construction assessment scenarios modelled for this assessment. The noise levels described in Table 22 are a worst-case scenario of a piece of equipment operating at full power and using machinery that may not have the latest technologies inbuilt, which may allow it to operate at a lower noise level than those listed below.

Table 22 Modelled construction activities and key plant noise levels

Scenario	Item	% of operation within 15-minute period	Equipment Sound Power Level, dBA	Total $L_{wA,15min}$ dBA
CS1 - Clearing and grubbing	excavator (30 T)	50	103	110
	chipper	50	110	
	Utes (x3)	20	85	
	tip-truck	50	105	
	street sweeper	5	91	
	skid steer	25	95	
	chain saws (x2)*	80	105	
	excavator (30 T)	50	103	
CS2 - Site gravel road construction	12 T single drum roller (low vib)	100	111	111
	Dozer	50	110	
	Wheeled loader	50	91	
	Grader	50	87	
	Trucks (incl water trucks)	20	91	
	Skid steer	100	83	
	Utes (4)	10	92	
CS3a – Cofferdam piling vibration	40T Crane track and Vibrodriver (30HV)	100	95	95
CS3b Cofferdam piling-impact	40T Crane track and Hydrohammer (S-40)	25	108	108
CS3c Cofferdam, construction and removal, and rockfill	20T rigid dump trucks	100	101	103
	30T Articulated haul truck	25	102	
	skid steer	50	91	
	45T excavator	25	95	

Scenario	Item	% of operation within 15-minute period	Equipment Sound Power Level, dBA	Total $L_{wA,15min}$ dBA
	12T vibratory roller (low vib)	20	90	
CS4 - Reservoir lowering	Ten (10) x 12" diesel pumps	100	113	86.9
CS5a - Dam crest demolition & excavation	Skid steer	50	91	120
	45t excavator with hydraulic hammer	100	120	
	skid steer	100	83	
	hand tools (battery)	50	87	
	concrete saw	25	103	
	generator	100	85	
	Stockpile	50	105	
	Haul route	10	86	
CS5b - Spillway demolition	40T Crane track	100	82	92
	45t excavator (with hydraulic hammer)	10	92	
	30T haul truck x4	100	86	
CS6 - Dam construction	concrete batch plant	100	71	101
	tower crane (x2)	100	95	
	Secant bored piling	100	101	
	concrete agitator (x4)	100	98	
	concrete vibrators (x3)	50	95	
	EWP	10	75	
	concrete saw	10	100	
	10T vibratory roller	20	95	
	haul route (x4 trucks)	100	86	
	hand tools	80	80	
	skid steer	100	76	