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KURRI KURRI ALUMINIUM SMELTER DECOMMISSIONING, DEMOLITION AND REMEDIATION

NOISE AND VIBRATION MANAGEMENT PLAN

RAMBOLL

KURRI KURRI ALUMINIUM SMELTER
DECOMMISSIONING AND DEMOLITION
NOISE AND VIBRATION MANAGEMENT PLAN

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Made by	**C Whitehill/ T Jackson**
Checked by	**S Taylor**
Approved by	**F Robinson**
Description	**Ramboll was engaged by Hydro Aluminium Kurri Kurri Pty Ltd to prepare a Remediation Works Environmental Management Plan (RWEMP) to describe how environmental management would be undertaken at the former Hydro Aluminium Kurri Kurri aluminium smelter at Hart Road Loxford, NSW and the surrounding land owned by Hydro. This Noise and Vibration Management Plan (NVMP) forms a component of the RWEMP.**

Ramboll Australia
Level 2, Suite 18
50 Glebe Road
PO Box 435
The Junction
NSW 2291
Australia
T +61 2 4962 5444
www.ramboll-environ.com

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ACRONYMS AND ABBREVIATIONS

CEMP	Construction Environmental Management Plan
DA	Development Application
EMP	Environmental Management Plan
EPA	Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
ft	foot
Hydro	Hydro Aluminium Kurri Kurri Pty Ltd
IPMP	Integrated Project Management Plan
mm/s	millimetres per second
NVMP	Noise and Vibration Management Plan
RBL	Rating Background Level
RWEMP	Remediation Works Environmental Management Plan
SAP	Smelter Access Plan
SSD	State Significant Development
t	tonne

GLOSSARY

Council	Cessnock City Council
Department	Department of Planning, Industry and Environment
Hydro	Hydro Aluminium Kurri Kurri Pty Ltd
LAeq	The equivalent sound pressure level. The steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
$LA_{eq(15mins)}$	The equivalent continuous A-weighted sound pressure level over a 15-minute period
LA_{90}	The A-weighted sound pressure level exceeded for 90 per cent of the time over which a given sound is measured. It represents the background noise
Rating Background Level	The median of the overall assessment background noise level calculated using NSW EPA *Industrial Noise Policy* methodology as defined in the glossary of acoustic terms.
Remediation	Remediation of contaminated land and soils at the Smelter and on Hydro Land, including the construction of a Containment Cell as addressed in the State Significant Development application to the Department of Planning and Environment SSD 6666.
Stage 1 Demolition	Demolition of Smelter buildings addressed in the development application to Cessnock City Council 8/2015/399/1
Stage 2 Demolition	Demolition of Smelter buildings, three concrete stacks, a water tower, subsurface structures to 1.5m below ground surface and operation of a concrete crushing plant addressed in the development application to Cessnock City Council 8/2018/46/1.
The Smelter	The former Hydro Aluminium Kurri Kurri Pty Ltd aluminium smelter at Hart Road, Loxford

1. INTRODUCTION

1.1 Background

This Noise and Vibration Management Plan (NVMP) has been prepared by Ramboll Australia Pty Ltd on behalf of Hydro Aluminium Kurri Kurri Pty Ltd (Hydro) to support the Remediation Works Environmental Management Plan (RWEMP) which addresses the decommissioning, demolition and remediation activities at the former Hydro Aluminium Kurri Kurri Smelter (the Smelter) at Hart Road Loxford and the management of the surrounding land owned by Hydro (the Hydro Land).

1.2 Objectives

The objectives of this NVMP are to:

- Provide a program to monitor noise and vibration during decommissioning, demolition and remediation activities at the Smelter and the Hydro Land.
- Detail the controls to be implemented to manage noise and vibration impacts.
- Provide a mechanism to assess performance against the noise and vibration impact assessment criteria.
- Detail the requirement for reporting exceedances of noise impact assessment criteria.
- Provide management commitments and strategies for dealing with noise and vibrational related issues.
- Establish the roles and responsibilities of all parties involved in noise and vibration management.
- Establish the supervision, monitoring and reporting framework for the NVMP.

1.3 Purpose and Scope

The NVMP applies to the management of noise at the Smelter site.

The purpose of the NVMP is to:

- Specify management procedures for noise and vibration related issues and impacts during activities at the Smelter and on the Hydro Land
- Satisfy the relevant conditions of the development consent for demolition activities (DA 8/2015/399/1; DA 8/2018/46/1)
- Satisfy the relevant conditions of the development consent for remediation activities (SSD 6666).

In addition, the plan aims to comply with relevant guidelines including:

- *Interim Construction Noise Guideline* (DECC, 2009)
- *Road Noise Policy* (DECCW, 2011)
- *Environmental Noise Management Assessing Vibration: A Technical Guideline* (DECC, 2006)
- German Standard *DIN 4150-3: Structural Vibration - effects of vibration on structures*
- British Standard *BS6472-1:2008 Guide to evaluation of human exposure to vibration in buildings, Part 1 – Vibration sources other than blasting*.
- British Standard *BS7385: Part 2-1993 Evaluation and measurement for vibration in buildings - Part 2: Guide to damage levels from ground borne vibration*.

1.4 Regulatory Requirements

A list of the development consent conditions related to noise management and where they are addressed in this document are outlined in **Table 1-1**.

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Table 1-1: Project Approval Conditions

No.	Condition	Location in NVMP
SSD 6666		
B36	**Hours of Work** The Applicant must comply with the hours detailed in Table 1, unless otherwise agreed in writing by the Planning Secretary. **Activity** / **Day** / **Time** Remediation Works / Monday - Friday / 7 am to 6pm Saturdays / 7 am to 1 pm	Section 2.3
B37	Works outside of the hours identified in Condition B38 may be undertaken in the following circumstances:	N/A
(a)	works that are inaudible at the nearest sensitive receivers;	Section 2.3
(b)	works agreed to in writing by the Planning Secretary; and	Section 2.3
(c)	where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm.	Section 2.3
	Remediation Works Noise Limits	
B38	Remediation works must be undertaken to achieve the construction noise management levels detailed in the Interim Construction Noise Guideline (DECC, 2009) (as may be updated or replaced from time to time). All feasible and reasonable noise mitigation measures must be implemented and any activities that could exceed the construction noise management levels must be identified and managed in accordance with the management and mitigation measures in the Appendix 2 and outlined in the Interim Construction Noise Guideline (DECC, 2009).	Section 3.1
	Vibration Criteria	
B39	Vibration caused by the remediation works at any residence or structure outside the site must be limited to:	N/A
(a)	for structural damage: German Standard DIN 4150 Part 3 Structural Vibration in Buildings; and	Section 4.1.2
(b)	for human exposure: the acceptable vibration values set out in Environmental Noise Management Assessing Vibration: A Technical Guideline (DECC, 2006).	Section 4.1.2
	Road Traffic Noise	
DA 8/2015/399/1		
10	Submit to Council an Environmental Management Plan (EMP) for review and written authorisation. The EMP shall contain, but not be limited to, the following specialist plans: Air Quality Management Plan, **Noise and Vibration Management Plan**, Waste Management, Soil and Water Management Plan, Demolition Strategy, Traffic Management Plan**,** Stakeholder Engagement and Notification Plan; Work Health and Safety Management Plan; and Heritage Management Measures and shall include, among other things, legislative and regulatory requirements; responsibilities for implementation of the management measures; and the monitoring, recording and improvement for environmental management performance.	This NVMP
13	The Noise and Vibration Management Plan (NVMP) prepared by a suitably qualified person shall include, but not be limited to, the Noise Mitigation Measures outlined in Table 4.19 of the Statement of Environmental Effects. The plan is to identify amelioration measures to ensure the noise and vibration levels will be compliant with the relevant AS. The report shall be prepared in consultation with any geotechnical report that itemises equipment to be used for excavation works. The plan shall also address the following matters:	

No.	Condition	Location in NVMP
	a) Identification of activities carried out, and associated noise sources	Section 2.2
	b) Identification of potentially affected sensitive receivers, including residences, churches, commercial premises, schools and properties containing noise sensitive equipment	Section 2.1 and Figure 2-1
	c) Determination of appropriate noise and vibration objectives for each identified sensitive receiver	Section 2.1
	d) Noise and vibration monitoring, reporting and response procedures	Section 4
	e) Assessment of potential noise and vibration from the proposed demolition, excavation and construction activities, including noise from construction vehicles	Section 2.2
	f) Description of specific mitigation treatments, management methods, and procedures to be implemented to control noise and vibration during construction	Section 3.2
	g) Construction timetabling to minimise noise impacts, including time and duration restrictions, respite periods and frequency	Table 3-2
	h) Procedures for notifying residents of construction activities likely to affect their amenity through noise and vibration	Table 3-2
	i) Contingency plans to be implemented in the event of non- compliances and/or noise complaints.	Section 3.2
DA 8/2018/46/1		
6	Proposed activities that would generate audible noise at the nearest sensitive receiver are to be undertaken between the following hours: • Monday to Friday 7.00am to 6.00pm • Saturday 7.00am to 1.00pm • No work to be undertaken on Sundays or Public Holidays	Section 2.3
	Other proposed works may be permitted outside the nominated workhours with restricted equipment as detailed in the Environmental Management Plan to be reviewed and authorised by Council prior to the commencement of works.	Section 3.2
10(b)	During excavation, demolition and construction phases, noise generated from the site must be controlled.	This NVMP
EPA Condition 6	EPA General Terms of Approval The proponent must ensure that demolition of the stacks and any other elevated structures is planned to minimise the risk of adverse noise and vibration impacts on the community.	Noted

2. EXISTING ENVIRONMENT AND POTENTIAL IMPACTS

2.1 Existing Environment

A series of baseline noise surveys were undertaken on Hydro Land and at noise sensitive receptors located in the vicinity of the Smelter site in 2015 (prior to any demolition and remediation activities) in order to determine project specific noise levels of the potentially affected areas across the site and at representative sensitive receptors located in the surrounding areas. Noise logging equipment was installed at twelve locations shown in **Figure 2-1**. Results of unattended noise monitoring are outlined in **Table 2-1**.

Table 2-1: Noise Monitoring Locations and Unattended Noise Monitoring Results

Location No.	Location Address	Period	LAeq	LA90	RBL
N01	6 Dawes Avenue, Loxford	Day	49	44	**43**
		Evening	48	43	**42**
		Night	47	43	**40**
N02	Hunter TAFE, Kurri Kurri Campus	Day	52	44	**44**
		Evening	46	43	**43**
		Night	46	41	**41**
N03	18 Bowditch Avenue, Loxford	Day	48	39	**38**
		Evening	46	35	**35**
		Night	42	37	**34**
N04	Hydro Land near 10 Howe Street, Cliftleigh	Day	51	38	**36**
		Evening	45	35	**35**
		Night	49	35	**32**
N05	Hydro Land near Glen Ayre Avenue, Cliftleigh	Day	46	39	**38**
		Evening	46	33	**33**
		Night	40	35	**31**
N06	Hydro Land near 532 Main Road, Cliftleigh	Day	49	42	**41**
		Evening	46	35	**34**
		Night	42	36	**33**
N07	Hydro Land near Lot 54, 464 Cessnock Road, Gillieston Heights	Day	59	45	**44**
		Evening	54	45	**44**
		Night	49	51	**36**
N08	Hydro Land near 532 Main Road, Cliftleigh	Day	58	36	**35**
		Evening	47	33	**33**
		Night	40	34	**32**
N09	Smelter Site, near substation	Day	45	39	**38**
		Evening	43	37	**37**
		Night	44	39	**36**
N10	Smelter Site, near Hunter Expressway	Day	50	45	**44**
		Evening	51	45	**44**
		Night	50	43	**38**
N11	14 Horton Road, Loxford	Day	55	50	**50**
		Evening	52	47	**47**
		Night	51	45	**42**
N12	Kurri Kurri Speedway Track, 73 Dickson Road, Loxford	Day	46	43	**41**
		Evening	46	38	**38**
		Night	43	39	**36**

Note:

- Rating Background Level (RBL) is defined in the NSW EPA *Industrial Noise Policy* as the median of the overall assessment background noise level calculated using NSW EPA *Industrial Noise Policy* methodology as defined in the glossary of acoustic terms.
- LAeq is the equivalent sound pressure level. The steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
- LA90 is the A-weighted sound pressure level exceeded for 90 per cent of the time over which a given sound is measured. It represents the background noise.

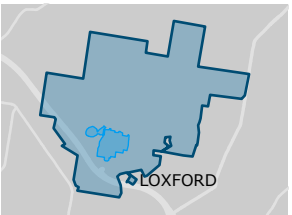
Aerial photography by Nearmap, flown 15.06.2020

Legend

Project site

Dust deposition monitoring location

A4
1:9,500



RAMBOLL AUSTRALIA - GIS MAP file : 318000533_GIS_P001_RemediationEMP | F011_AIRMonitoring_V02 | 5/11/2020

Appendix 2 | Dust Deposition Monitoring Locations

Attended monitoring was undertaken at these locations to verify noise levels and to quantify the dominant and contributory noise sources associated with the overall ambient noise levels in the area.

Attended monitoring identified a number of influences on the local noise environment, including:

- Traffic noise from the Hunter Expressway and Main Road-Cessnock Road.
- Construction noise from new housing land at Cliftleigh and Gillieston Heights, as well as construction activities at the Hunter TAFE.
- Industrial activities (such as metal fabrication business).
- Occasional air traffic.
- Sounds typical of the rural and bushland environment (such as agricultural activities and animal sounds).

2.2 Potential Impacts

2.2.1 Demolition Noise

Predicted noise levels were based on the worst-case scenario for demolition and remediation activities, where the plant and equipment are placed closer to the noise sensitive receptors, at the southern end of the pot rooms and the north-eastern corner of Smelter site.

The predicted noise levels associated with the modelled worst-case scenario comply with the standard construction noise criteria at all noise sensitive receptors. However, the worst-case scenario is predicted to exceed the noise criteria for outside standard construction hours at three noise sensitive receptors:

- At 6 Dawes Avenue, Loxford (approximately 540 metres to the southeast of the Smelter site) and Scales Avenue, Loxford (approximately 490 metres to the south of the Smelter site) during the day (outside standard hours), evening and night-time periods. The residence at Scales Avenue has since been vacated and demolished.
- 103 Bishops Bridge Road, Sawyers Gully (approximately 650 metres to the west of the Smelter site) during the evening and night-time period.

Noise levels at all of the noise sensitive receptors are predicted to comply with the highly affected noise criteria during standard construction hours and outside standard construction hours.

2.2.2 Sleep Disturbance

A sleep disturbance assessment was undertaken using the reduced number of equipment that could be used so as to comply with the outside standard construction hours' criteria. The sleep disturbance assessment predicted that the sleep disturbance criteria would not be exceeded at residential receivers.

2.2.3 Road Traffic

Noise modelling was undertaken to assess the potential noise impacts on existing noise sensitive receptors associated with vehicle movements along Hart Road (South) and the Hunter Expressway (between Main Road - Cessnock Road and Allandale Road). The noise model took into account all noise sources associated with traffic that may be generated in conjunction with the activities, to determine the potential cumulative road traffic noise levels in the area.

Modelling predicted that the additional traffic generated by the activities along the Hunter Expressway and Hart Road (South) is insignificant as the relative increase between the existing and future traffic noise levels is extremely low. Therefore, the predicted noise impact associated with the demolition and remediation activities would comply with the *Road Noise Policy* (DECCW, 2011) criteria.

In addition, the internal noise levels from road traffic at existing noise sensitive receptors are predicted to be below the applicable maximum internal noise level limits, which would not be expected to cause any awakening reactions to occupants and would be unlikely to cause sleep disturbance impacts.

2.2.4 Vibration

Vibration impacts are expected to be caused by a number of construction plant: including compactor, crushing plant, vibratory roller, bulldozer and truck traffic. Vibration will also be generated by the actual demolition of the structures (such as wall sections falling to ground).

The actual vibration levels that may impact upon properties located in the vicinity of the Smelter site may vary. This is due to the fact that vibration magnitudes would dissipate at varying levels dependent on ground conditions and source level variations associated with operational conditions of the plant and equipment.

The nearest receivers to the Smelter are located approximately 270 metres to the south of the Smelter. The Noise and Vibration Impact Assessment prepared for the Demolition and Remediation Environmental Impact Statements predicted that it is unlikely that there would be any vibration impacts generated by plant that would give rise to annoyance or structural damage at this or any of the nearest receivers.

2.3 Hours of Operation

Activities at the Smelter will generally be undertaken between 7:00 am to 6:00 pm, Mondays to Fridays and 7:00 am to 1:00 pm on Saturdays in accordance with Condition B38 of SSD 6666. Works outside of these hours may be undertaken in the following circumstances in accordance with Condition B39:

- Works that are inaudible at the nearest sensitive receivers
- Works agreed to in writing by the Planning Secretary
- Where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm.

There is the potential that vehicle movements (such as removal or delivery of major equipment or structures, or to service activities that need to occur at the Smelter outside of standard hours) and limited activities at the Smelter site may be required outside of these hours.

Appendix 1 identifies the activities and types of machinery that can be used at the Smelter for activities outside of standard construction hours and continue to comply with the noise criteria for the Smelter activities.

3. IMPLEMENTATION

3.1 Roles and Responsibilities

Key personnel responsible for implementation of this NVMP are in **Table 3-1** and consistent with the overall RWEMP.

Table 3-1: Hydro Personnel and Environmental Management Responsibilities

Position	Responsibilities
OVERALL SITE MANAGEMENT	
Managing Director	Make certain that the Hydro Team and contractors are implementing this NVMP. Provide adequate resources and funding for the implementation of this NVMP. Review and approve RWEMP (including this NVMP).
Principal Environmental Consultant	Provide advice on and assistance in implementation, monitoring and auditing of environmental management and performance. Review and modify the RWEMP as directed by the Managing Director and/or Project Manager.
Principal Communications Consultant	Manage the mechanisms available for the community to receive information and to make enquiries or complaints about activities
SMELTER DECOMISSIONING, DEMOLITION AND REMEDIATION ACTIVITIES	
Project Manager	Make certain that any proposed works or changes to existing activities, that may have an impact on the environment or the community (including noise and vibration impacts), have the necessary legislative approval prior to the commencement of works. Make certain that the environmental aspects and issues, associated with proposed works or changes to existing activities, are adequately addressed in the NVMP. Review and approve the NVMP on an annual basis or when changes to activities at the Smelter occur. Facilitate implementation of the NVMP.
Construction Manager	Verify that the work of contractors and Hydro personnel on the Project are undertaken in accordance with this NVMP, relevant environmental management plans, procedures and standards. Provide appropriate training to contractors and Hydro personnel on the Project regarding environment and community requirements and responsibilities. Review and approve the contractors' environmental management documentation prior to commencement of activities and inform contractors of changes to the NVMP.
Contract Administrator	Provide relevant environmental legislative, regulatory and management requirements in tender documentation. Verify that the work of contractors is undertaken in accordance with this NVMP and other relevant environmental procedures and standards.
Workplace Health and Safety (WHS) Manager	Provide Hydro personnel with the necessary tools and training to enable effective implementation of the RWEMP. Implement and maintain an induction package to be provided to all personnel working at the Smelter and Hydro Land, which will include information relevant to the environmental and community management (including noise and vibration management). Undertake a weekly inspection of the Project activities at the Smelter, for the duration of the Project.

Position	Responsibilities
	Maintain a record of personnel induction and training records.
Demolition Contractor	Comply with the requirements of the NVMP as it applies to Smelter demolition activities. Implement the environmental measures and actions as described in the NVMP through a Demolition EMP, supporting sub-plans and specific procedures that comply with this NVMP. Develop and implement procedures for self-checking environmental management compliance with the Demolition Contractor's procedures and this NVMP. Report potential or actual environmental incidents associated with demolition activities at the Smelter, and assist as required in the investigation, implementation of corrective actions and recording of the incident.
Remediation Contractor	Comply with the requirements of the NVMP as it applies to Smelter and relevant Hydro Land remediation activities. Implement the environmental measures and actions as described in the NVMP through a Remediation EMP, supporting sub-plans and specific procedures that comply with this NVMP. Develop and implement procedures for self-checking management compliance with the Remediation Contractor's procedures and this NVMP. Report potential or actual environmental incidents associated with remediation activities at the Smelter and relevant Hydro Land, and assist as required in the investigation, implementation of corrective actions and recording of the incident.
CARE, MAINTENANCE AND HYDRO LAND MANAGEMENT ACTIVITIES	
Environmental Officer/ Hydro Land Manager	Coordinate and implement the environmental monitoring program Verify that the work of contractors and Hydro personnel on Hydro Land are undertaken in accordance with this NVMP and relevant environmental procedures and standards. Undertake a weekly inspection of activities on the Hydro Land that would occur for two weeks or more.
ALL AREAS AND ACTIVITIES	
Contractors	Comply with the requirements of the NVMP as it applies to site environmental management and control. Implement the environmental measures and actions as described in the NVMP through procedures and management plans that comply with this NVMP. Develop and implement procedures for self-checking management compliance with Contractor's procedures and this NVMP.
All Personnel	Implementation of the relevant environmental measures described in this NVMP applicable to their activities.

3.2 Management Measures

Hydro will implement a number of controls to manage noise impacts that may be generated from demolition activities. The noise management measures to be implemented are outlined in **Table 3-2**.

Table 3-2: Noise Mitigation Measures

Mitigation Measures	Action	Timing / Frequency	Responsibility	Further Detail
All personnel will be informed during the site induction of their obligations to minimise noise and the need to take reasonable and practical measures to minimise impacts.	Noise management obligations and control measures to be communicated to personnel during site induction.	Prior to and during activities	Project Manager Demolition Contractor Remediation Contractor	Section 3.3.2 of the RWEMP (inductions and training) Daracon Integrated Project Management Plan (IPMP) Appendix 2 of Appendix 4 CMA Construction Environmental Management Plan (CEMP) Appendix D
	Truck drivers are to be informed of site access routes, acceptable delivery hours and must minimise extended periods of engine idling.	Prior to and during activities	Project Manager Demolition Contractor Remediation Contractor Site Services Manager	Smelter Access Plan (SAP) Appendix A Section 3.3.2 of the RWEMP (inductions and training)
	A Driver Code of Conduct and induction training will be developed and implemented for the remediation activities to minimise road traffic noise. The Driver Code of Conduct and induction training for must be reviewed and updated as applicable for the duration of remediation activities.	During remediation activities	Remediation Contractor	Section 3.3.2 of the RWEMP (inductions and training)
Vehicles and machinery will be selected with consideration of noise emissions.	Undertake a review of vehicles and machinery so that plant are selected with consideration of noise emissions. Contractors and machinery suppliers are to consider the sound power level of equipment and plant listed in **Appendix 2**, and provide comparable equipment and machinery.	Prior to and during activities	Project Manager Demolition Contractor Remediation Contractor Site Services Manager	**Appendix 2** CMA CEMP Appendix D Daracon IPMP Appendix 2 of Appendix 4
	Equipment with effective mufflers, enclosures and low-noise tool bits and blades must be procured and utilised, where practicable.	Prior to and during activities	Project Manager	CMA CEMP Appendix D Daracon IPMP Appendix 2 of Appendix 4

Mitigation Measures	Action	Timing / Frequency	Responsibility	Further Detail
Activities that will generate an audible noise at sensitive receivers will be limited to occur during specified timeframes.	Activities that will generate an audible noise at sensitive receivers will be undertaken between the hours of 7:00 am to 6:00 pm Mondays to Fridays and 7:00 am to 1:00 pm on Saturdays.	Prior to and during activities	Project Manager Demolition Contractor Remediation Contractor Site Services Manager	**Section 2.3** (hours of operation) **Appendix 3**
	If activities are to be undertaken outside of the standard activity hours, concurrently operating machinery are to be consistent with those described in **Appendix 1**.	Prior to and during activities	Project Manager Demolition Contractor Remediation Contractor Site Services Manager	**Appendix 1**
Machines found to produce excessive noise compared to typical noise levels will be removed and replaced, or repaired or modified prior to recommencing works.	Undertake inspections of activities that may create unexpected excessive noise. If activities are found to produce excessive noise, remove or replace machinery, or modify activities prior to recommencing works.	During activities	Project Manager Demolition Contractor Remediation Contractor Site Services Manager	Section 5.2 of the RWEMP (inspections)
	Where practicable vehicles and machinery will be turned off or throttled down when not in use.	Prior to and during activities	Project Manager Demolition Contractor Remediation Contractor Site Services Manager	
	Equipment will be inspected and maintained in accordance with manufacturer's requirements.	Prior to and during activities	Project Manager Demolition Contractor Remediation Contractor Site Services Manager	Section K of the CMA CEMP Appendix B (maintenance)
If required mains power will be utilised for temporary traffic signals / work area lighting where possible. Where this is not feasible silenced generator sets are to be used instead.	Where required temporary traffic signals and lighting will be powered by mains power where possible. If this is not feasible, silenced generator sets will be procured for use.	Prior to and during activities	Project Manager Demolition Contractor Remediation Contractor Site Services Manager	

Mitigation Measures	Action	Timing / Frequency	Responsibility	Further Detail
Record all noise complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	Upon receiving a noise complaint regarding activities, the following steps will be undertaken: • The person nominated in the Stakeholder Engagement Plan will investigate the source of the complaint. The aim will be to initiate an investigation no later than two hours after the complaint has been made (dependent on the nature of the complaint); • Where practicable a visit will be made to the complainant to verify the nature of the complaint; • Where justified, appropriate action will be taken to amend the activity causing the complaint.	Prior to and during activities	WHS Manager Environmental Officer Principal Environmental Consultant	Section 3.5.6 of the RWEMP (complaints) Stakeholder Engagement Plan (**Appendix K**)
	Where three or more substantiated noise complaints of a similar nature are received (from at least two complainants), undertake a review of the work element in order to assess whether the work methods can be changed or if additional mitigation methods can be employed in order to prevent or reduce the likelihood of further complaints being made.	Prior to and during activities	Environnmental Officer Principal Environmental Consultant	Section 3.5.6 of the RWEMP (complaints)
	Undertake attended noise monitoring in response to substantiated complaints in order to validate and assess the source(s) giving rise to complaint(s).	Prior to and during activities	Environmental Officer Principal Environmental Consultant	**Figure 2-1** (noise monitoring locations) **Section 4.1.3** (noise monitoring program)
Record any exceptional incidents that cause noise or vibration and the action taken to resolve the situation in the Hydro incident reporting system.	Record noise or vibration related incidents in the incident register and implement corrective actions	Prior to and during activities As required	Environmental Officer WHS Manager	Section 3.5.4 of the RWEMP (incidents) Section 5.4 of the RWEMP (corrective action)
	Review corrective actions	Prior to and during activities Monthly	Environmental Officer WHS Manager	Section 5.4 of the RWEMP (corrective action)
Carry out regular site inspections to monitor compliance with the NVMP, record inspection results, and make an inspection log available to the EPA, the Department or Cessnock City Council if asked.	Undertake weekly inspection of activities to assess effectiveness of noise control measures.	Prior to and during activities Weekly	WHS Manager	Section 5.2 of the RWEMP (inspections)
	Undertake environmental inspections of the Smelter and the Hydro Land to assess compliance with the NVMP.	Prior to and during demolition Monthly	Environmental Officer WHS Manager	Section 5.2 of the RWEMP (inspections)

4. MONITORING AND REVIEW

4.1 Monitoring

As noted in **Table 3-2** attended monitoring will be undertaken in response to substantiated noise or vibration complaints in order to validate and assess the source(s) giving rise to complaint(s).

Any monitoring would be undertaken by a suitability qualified acoustics consultant. The results of the monitoring would be communicated to the complainant as noted in **Table 3-2** in accordance with the Stakeholder Engagement Plan.

4.1.1 Noise

Noise monitoring results would be compared against the receptor-specific criteria identified in **Appendix 3**.

4.1.2 Vibration

In the event a vibration complaint is received and substantiated, vibration levels would be monitored and compared against either:

- Where the complaint is about disruption or discomfort: *Assessing Vibration: A Technical Guideline* (DECC, 2006)
- Where the complaint is about structural damage: *DIN 4150-3 Structural Vibration Part 3: Effects on buildings and structures*

The recommended vibration dose values (VDV) levels outlined in *Assessing Vibration: A Technical Guideline*, which specifies levels of VDV expressed in daytime, night-time and typical human response, are presented in **Table 4-1**.

Table 4-1: Acceptable vibration values for intermittent vibration in various buildings (m/s1.75)

Location	Daytime (7am-10pm)		Night-time (10pm-7am)	
	Preferred Value $m/s^{1.75}$	Maximum Value $m/s^{1.75}$	Preferred Value $m/s^{1.75}$	Maximum Value $m/s^{1.75}$
Critical areas	0.1	0.2	0.1	0.2
Residences	0.2	0.4	0.13	0.26
Offices, schools, educational institutions and places of worship	0.4	0.8	0.4	0.8
Workshops	0.8	1.6	0.8	1.6

Note: Examples of critical areas include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against the continuous or impulsive criteria for critical cases.

4.1.3 Monitoring Program

The noise and vibration monitoring program is outlined in **Table 4-2**.

Table 4-2: Noise and Vibration Monitoring Commitments

Monitoring Details	Frequency	Locations	Parameters	Person/s Responsible
Monitoring of noise and/or vibration impacts at point source or sensitive receivers in response to substantiated community complaints	As required (in response to a substantiated noise complaint)	Location of monitoring to be determined based on location of community complaint.	Comparison to site specific noise criteria at the nearest location to the complainant Comparison to vibration criteria	WHS Manager Principal Environmental Consultant

4.1 Reporting

All internal and external environmental reporting requirements will be undertaken in accordance with Section 3.5 of the RWEMP.

Reporting will also be undertaken in accordance with relevant legislation, guideline and notification requirements, as outlined in **Section 1.4**.

4.2 Non-conformances

The need for preventative or corrective action arises from the identification of non-conformance with environmental legal requirements, Hydro environmental requirements or the potential for non-conformances to occur.

Non-conformances will be resolved and recorded in accordance with Section 3.5.5 of the RWEMP.

4.3 Complaints

Community Complaints are considered environmental incidents and are investigated and documented accordingly. This will include any complaints relating to noise from decommissioning, demolition and remediation activities.

Investigations will be conducted as described in **Table 3-2**. Corrective actions will be documented and regularly reviewed until completion and signed off.

Handling of complaints will be undertaken in accordance with **Table 3-2**, and Section 3.5.6 of the RWEMP.

4.4 Review and Improvement

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

The Environmental Officer is responsible for ensuring that a regular review of the RWEMP and specialist management plans (including this NVMP) is undertaken.

Reviews will be recorded in the document control section of this plan.

5. REFERENCES

British Standard. 2008. *6472-1:2008 Guide to evaluation of human exposure to vibration in buildings, Part 1 – Vibration sources other than blasting*.

British Standard. 1993. *7385: Part 2-1993 Evaluation and measurement for vibration in buildings - Part 2: Guide to damage levels from ground borne vibration*.

Department of Environment and Climate Change (DECC). 2009. *Interim Construction Noise Guideline*.

DECC. 2006. *Assessing Vibration: A Technical Guideline*.

Department of Environment, Climate Change and Water (DECCW). 2011. *Road Noise Policy*.

German Standard. *DIN 4150-3 Structural Vibration Part 3: Effects on buildings and structures*

Ramboll. 2018. *Environmental Impact Statement: Former Hydro Aluminium Kurri Kurri Smelter Stage 2 Demolition*.

Ramboll. 2019. *Response to Submissions Report: Former Hydro Aluminium Kurri Kurri Smelter Remediation*.

Ramboll Environ. 2015*. Statement of Environmental Effects - Demolition of Former Aluminium Smelter Buildings at Kurri Kurri.*

Ramboll Environ. 2016. *Environmental Impact Statement: Former Hydro Aluminium Kurri Kurri Smelter Demolition and Remediation*.

6. LIMITATIONS

Ramboll Australia Pty Ltd prepared this report in accordance with the scope of work as outlined in our proposal to Hydro Aluminium Pty Ltd dated 20 July 2018 and in accordance with our understanding and interpretation of current regulatory standards.

Site conditions may change over time. This report is based on conditions encountered at the site at the time of the report and Ramboll Australia Pty Ltd disclaims responsibility for any changes that may have occurred after this time.

The conclusions presented in this report represent Ramboll Australia Pty Ltd's professional judgment based on information made available during the course of this assignment and are true and correct to the best of Ramboll Australia Pty Ltd's knowledge as at the date of the assessment.

Ramboll Australia Pty Ltd did not independently verify all of the written or oral information provided to Ramboll Australia Pty Ltd during the course of this investigation. While Ramboll Australia Pty Ltd has no reason to doubt the accuracy of the information provided to it, the report is complete and accurate only to the extent that the information provided to Ramboll Australia Pty Ltd was itself complete and accurate.

This report does not purport to give legal advice. This advice can only be given by qualified legal advisors.

6.1 User Reliance

This report has been prepared exclusively for Hydro Aluminium Pty Ltd. It may not be relied upon by any other person or entity without Ramboll Australia Pty Ltd's express written permission.

APPENDIX 1
OUT OF STANDARD CONSTRUCTION HOURS MAXIMUM PERMISSIBLE EQUIPMENT

Key Task	Activities – Scenarios	Out of Standard Hours Period		
		Day (7am to 6pm)	Evening (6pm to 10pm)	Night (10pm to 7am)
Stage 1 Demolition	Demolition	1 x 46t Excavator with shear, hammer, bucket and pulverised attachment 4 x 36t Excavators with shear, hammer, bucket and pulverised attachment 2 x 80ft Boomlifts 2 x 40t Dump trucks 1 x Telehandler 1 x 25t Watercart 1 x Concrete Crushing plant	3 x 36t Excavators with shear, hammer, bucket and pulverised attachment 2 x 40t Dump trucks 1 x 25t Watercart 1 x Concrete crushing plant	3 x 36t Excavators with shear, hammer, bucket and pulverised attachment 2 x 40t Dump trucks 1 x 25t Watercart
Phase 1 of the Project (Demolition Continuation concurrent with Remediation Establishment)	Continuation of Stage 1 Demolition compound, concrete crushing plant and stockpile area	As stated above plus: 1 x 70t Excavators with shear, hammer and bucket attachment	1 x 46t Excavator with shear, hammer, bucket and pulverised attachment 4 x 36t Excavators with shear, hammer, bucket and pulverised attachment 2 x 80ft Boomlifts 2 x 40t Dump trucks 1 x Telehandler 1 x 25t Watercart 1 x Concrete crushing plant	As stated above
	Installation of the Project's environmental controls	2 x 36t Excavators	2 x 36t Excavators	2 x 36t Excavators
	Construction of Haul Road and Containment Cell utilities/services	2 x 36T Excavators 2 x Graders 4 x 30t Articulated trucks 2 x Dozers	No activities for this scenario	No activities for this scenario
	Containment Cell Establishment (including VENM/ENM Stockpile and compound area)	1 x Wheel dozer 3 x 36t Tracked excavators 3 x Compactors/rollers 4 x 30t Articulated trucks 2 x Backhoes 2 x 25t Water carts	1 x Wheel dozer 3 x 36t Tracked excavators 3 x Compactors/rollers 4 x 30t Articulated trucks 2 x Backhoes 2 x 25t Water carts	1 x Wheel dozer 3 x 36t Tracked excavators 3 x Compactors/rollers 4 x 30t Articulated trucks 2 x Backhoes 2 x 25t Water carts

Key Task	Activities – Scenarios	Out of Standard Hours Period		
		Day (7am to 6pm)	Evening (6pm to 10pm)	Night (10pm to 7am)
Phase 2 of the Project (further Remediation Establishment)	Removal of Smelters waste stockpiles near anode baking furnace	2 x 36t Excavators 4 x 30t Articulated trucks	2 x 36t Excavators 4 x 30t Articulated trucks	2 x 36t Excavators 4 x 30t Articulated trucks
	Continuation of compound, concrete plant, stockpile area and ancillary facilities	1 x 46t Excavator with shear, hammer, bucket and pulverised attachment 4 x 36t Excavators with shear, hammer, bucket and pulverised attachment 1 x 80ft Boomlifts 2 x 40t Dump trucks 1 x 25t Watercart 1 x Concrete Crushing plant	1 x 46t Excavator with shear, hammer, bucket and pulverised attachment 4 x 36t Excavators with shear, hammer, bucket and pulverised attachment 1 x 80ft Boomlifts 2 x 40t Dump trucks 1 x 25t Watercart 1 x Concrete Crushing plant	1 x 46t Excavator with shear, hammer, bucket and pulverised attachment 4 x 36t Excavators with shear, hammer, bucket and pulverised attachment 1 x 80ft Boomlifts 2 x 40t Dump trucks 1 x 25t Watercart 1 x Concrete Crushing plant
Phase 3 of the Project (remediation and Excavation)	Establishment and operation of Containment Cell and Capped Waste Stockpile leachate treatment plant	2 x 36t Excavators 2 x Landfill Compactors 4 x 30t Articulated trucks 2 x 25t Water carts	2 x 36t Excavators 4 x 30t Articulated trucks 2 x 25t Water carts	2 x 36t Excavators 4 x 30t Articulated trucks 2 x 25t Water carts
	Continuation of compound, concrete crushing plant, stockpile area and ancillary facilities	1 x Concrete crushing plant	1 x Concrete crushing plant	
	Continuation of removal and transportation of capped Waste Stockpile material	3 x 36t Excavators 2 x Landfill Compactors 4 x 30t Articulated trucks 2 x 25t Water carts	3 x 36t Excavators 4 x 30t Articulated trucks 2 x 25t Water carts	3 x 36t Excavators 4 x 30t Articulated trucks 2 x 25t Water carts
	Continue placing material in Containment Cell	3 x 36t Excavators 4 x 30t Articulated trucks 2 x 25t Water carts	3 x 36t Excavators 4 x 30t Articulated trucks 2 x 25t Water carts	3 x 36t Excavators 4 x 30t Articulated trucks 2 x 25t Water carts
	Excavation of contaminated soils and transportation to and placement in the Containment Cell	2 x 36t Excavators 2 x Graders 4 x 30t Articulated Trucks	2 x 36t Excavators 2 x Graders 4 x 30t Articulated Trucks	2 x 36t Excavators 2 x Graders 4 x 30t Articulated Trucks

Key Task	Activities – Scenarios	Out of Standard Hours Period		
		Day (7am to 6pm)	Evening (6pm to 10pm)	Night (10pm to 7am)
Phase 4 of the Project (Remediation)	Continuation of compound, concrete crushing plant, stockpile area and ancillary facilities	4 x 36t Excavators with shear, hammer, bucket and pulveriser attachment 2 x 40t Dump trucks 1 x 25t Water truck 1 x Concrete crushing plant	1 x Concrete crushing plant	
	Continuation removal and transportation of Capped Waste Stockpile material	3 x 36t Excavators 4 x 30t Articulated Trucks 2 x 25t Water carts	3 x 36t Excavators 4 x 30t Articulated Trucks 2 x 25t Water carts	3 x 36t Excavators 4 x 30t Articulated Trucks 2 x 25t Water carts
	Continue placing material in Containment Cell	3 x 36t Excavators 4 x 30t Articulated trucks 2 x 25t Water carts	3 x 36t Excavators 4 x 30t Articulated trucks 2 x 25t Water carts	3 x 36t Excavators 4 x 30t Articulated trucks 2 x 25t Water carts
Phase 5 of the Project (Remediation Completion)	Continuation of compound	1 x 46t Excavator with shear, hammer, bucket and pulverised attachment 4 x 36t Excavators with shear, hammer, bucket and pulveriser attachment 2 x 40t Dump trucks 1 x 25t Water truck	1 x 46t Excavator with shear, hammer, bucket and pulverised attachment 4 x 36t Excavators with shear, hammer, bucket and pulveriser attachment 2 x 40t Dump trucks 1 x 25t Water truck	4 x 36t Excavators with shear, hammer, bucket and pulveriser attachment 2 x 40t Dump trucks 1 x 25t Water truck
	Excavation and remediation of eastern and western dam. Material from dam floors to be placed in the Containment Cell	3 x 36t Excavators 4 x 30t Articulated trucks 2 x 25t Water carts	3 x 36t Excavators 4 x 30t Articulated trucks 2 x 25t Water carts	3 x 36t Excavators 4 x 30t Articulated trucks 2 x 25t Water carts
	Excavation of contaminated natural soils from the Capped Waste Stockpile footprint and transportation to and placement in the Containment Cell	3 x 36t Excavators 4 x 30t Articulated trucks 2 x 25t Water carts	3 x 36t Excavators 4 x 30t Articulated trucks 2 x 25t Water carts	3 x 36t Excavators 4 x 30t Articulated trucks 2 x 25t Water carts

APPENDIX 2
EQUIPMENT SOUND AND VIBRATION LEVELS

Sound Levels

Plant and Equipment	Sound Power Levels (dBA)
230t Excavators with grab and bucket attachment	117
120t Excavators with shear and grab attachment	114
70t Excavators with shear, hammer and bucket attachment	114
46t Excavator with shear, hammer, bucket and pulverised attachment	109
36t Excavators with shear, hammer, bucket and pulveriser attachment	104
80ft Boomlifts	105
40t Dump trucks	118
Telehandler	106
25t Water truck	108
Concrete crushing plant	115
Concrete saw	115
Jackhammer	113
Delivery truck	108

Vibration Levels

Typical Vibration levels of construction plant items	Typical Ground vibration level
Vibratory roller	Up to 1.5 mm/s @ 25 m
Compactor	20 mm/s @ 5 m <0.3 mm/s @ 30 m
Bulldozer	1 – 2 mm/s @ 5 m 0.1 mm/s @ 50 m
Truck traffic (smooth surface)	< 0.2 mm/s @ 20 m

APPENDIX 3
NOISE CRITERIA LEVELS AT IDENTIFIED SENSITIVE RECEIVERS

Receiver	Day Time Criteria	Evening Criteria	Night Time Criteria
A1	55	55	55
CC1	55	55	55
CC2	55	55	55
CC3	55	55	55
CC4	55	55	55
CHC1	55	55	55
CHC2	55	55	55
CHC3	55	55	55
CHC4	55	55	55
CHC5	55	55	55
CHC6	55	55	55
H1	55	55	55
H2	55	55	55
R1	40	38	37
R2	49	49	41
R3	43	40	39
R4	48	47	45
R5	48	47	45
R6	55	52	47
R7	54	49	43
R8	54	49	43
RE1	65	60	60
RE2	65	60	60
RE3	60	60	60
RE4	60	60	60
RE5	60	60	60
RE6	60	60	60
RE7	60	60	60
S1	55	55	55
S2	55	55	55
S3	55	55	55
S4	55	55	55
S5	55	55	55
S6	55	55	55
S7	55	55	55
S8	55	55	55