

Construction Noise and Vibration Management Plan

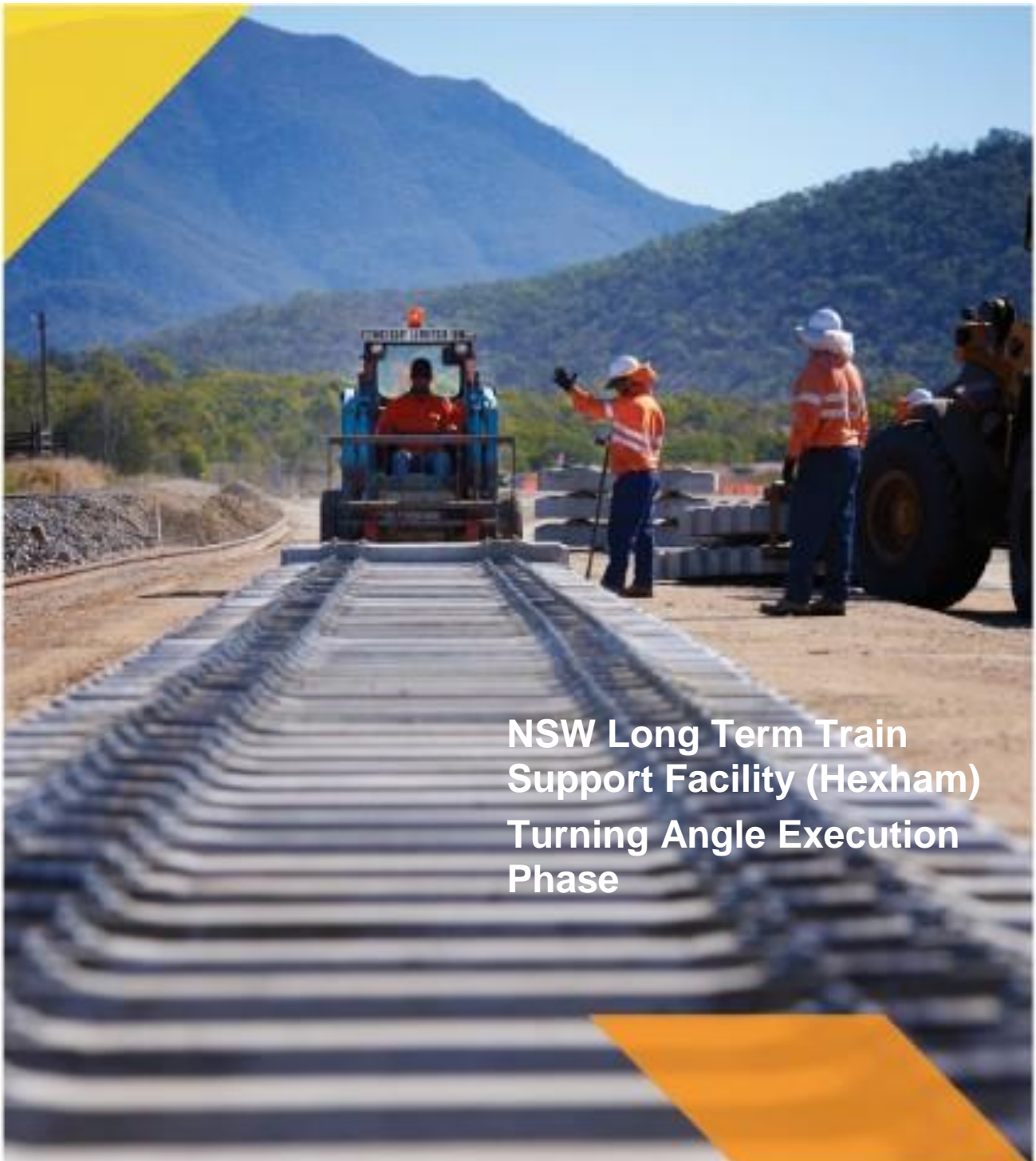


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Document Approval/ Sign Off

Position	Name	Signature	Date
Project Manager	Julian Bailey		20/12/19

Version Control

Rev	Date	Author	Comments
1	27/11/2019	Harry Egan	Final

1.0 Purpose

This Construction Noise and Vibration Management Plan (CNVMP) supplements the Project Construction Environmental Management Plan (CEMP) for the construction phase of the NSW Long Term Train Support Facility (TSF) Turning Angle. This CNVMP is based on the:

- Hexham Train Support Facility Noise Impact Assessment (SLR, September 2012) prepared by SLR Consulting Australia (2013); and
- Hexham Train Support Facility – Turning Angle Noise Impact Assessment (SLR, 11 February 2019).

This CNVMP provides:

- Summary of noise impact predictions;
- Identifies sensitive receivers;
- Specific construction noise goals;
- Details noise control measures;
- Out of hours work protocols; and
- Monitoring requirements.

This CNVMP addresses the relevant Ministers Conditions of Approval (MCoA) as shown in Table 1.1.

Table 1.1 Relevant Ministers Conditions of Approval

MCoA	Task Detail	Where addressed
C1	The SSI shall be designed and operated with the objective of not exceeding the vibration goals for human exposure for existing sensitive receivers, as presented in <i>Assessing Vibration: a Technical Guideline</i> (DECC, 2006).	Section 3.0
C2	The Proponent shall ensure that the SSI is designed and operated so as not to exceed the operational noise limits.	Section 2.0
E18	Construction activities (including the delivery of materials) associated with the SSI shall be undertaken during the following standard construction hours: a) 7:00 am to 6:00 pm Mondays to Fridays, inclusive; and b) 8:00 am to 1:00 pm Saturdays; c) at no time on Sundays or public holidays.	Section 1.1
E19	Construction activities (including the delivery of materials) outside of the prescribed construction hours identified in condition E18 may be undertaken in the following circumstances: a) construction works where the cumulative air-borne noise generated is: i. no more than 5 dB(A) above the rating background level at any residence in accordance with the <i>Interim Construction Noise Guideline</i> (DECC, 2009); and ii. no more than the noise management levels specified in Table 3 of the <i>Interim Construction Noise Guideline</i> (DECC, 2009) at other sensitive receivers; b) where a negotiated agreement has been reached with affected receivers as the prescribed noise and vibration levels cannot be achieved;	Section 1.1

MCoA	Task Detail	Where addressed
	<ul style="list-style-type: none"> c) for the delivery of materials required outside these hours by the NSW Police Force, RMS or other authorities for safety reasons; d) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm; or e) works approved through an EPL (including rail possessions) and in accordance with an out-of-hours works procedure. 	
E20	<p>Except as expressly permitted by an EPL, high noise impact activities and works resulting in impulsive or tonal noise emissions (such as rock breaking, rock hammering and pile driving) shall only be undertaken:</p> <ul style="list-style-type: none"> a) between the hours of 8:00 am to 5:00 pm Monday to Friday; b) between the hours of 8:00 am to 1:00 pm Saturday; and c) in continuous blocks not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block. <p>For the purposes of this condition 'continuous' includes any period during which there is less than a one hour respite between ceasing and recommencing any of the work which is the subject of this condition.</p>	Section 1.1
E21	<p>The Proponent shall implement all reasonable and feasible noise mitigation measures with the aim of achieving the construction noise management levels detailed in the <i>Interim Construction Noise Guideline</i> (DECC, 2009). Any activities that could exceed the construction noise management levels shall be identified and managed in accordance with the Construction Noise and Vibration Management Plan required under condition E63 (c) of this approval.</p> <p><i>Note: The Interim Construction Noise Guideline identifies 'particularly annoying' activities that require the addition of 5 dB(A) to the predicted level before comparing to the construction noise management levels.</i></p>	Annexure 2
E22	<p>The SSI shall be constructed with the aim of achieving the following construction vibration goals and ground-borne noise levels:</p> <ul style="list-style-type: none"> a) for structural damage vibration, the vibration limits set out in the German Standard <i>DIN 4150 Part 3-1999 Structural Vibration in Buildings - Effects on Structures</i>; b) for human exposure, the acceptable vibration values set out in the <i>Environmental Noise Management Assessing Vibration: A Technical Guideline</i> (DEC, 2006); and c) the ground-borne noise levels set out in the <i>Interim Construction Noise Guideline</i> (DECC, 2009). 	Annexure 2
E23	<p>Wherever feasible and reasonable, piling activities shall be undertaken using quieter alternative methods than impact or percussion piling, such as bored piles or vibrated piles.</p>	Section 4.1
E63	<p>c) A Construction Noise and Vibration Management Plan to detail how construction noise and vibration impacts will be minimised and managed. The Plan shall include, but not necessarily be limited to:</p> <ul style="list-style-type: none"> i. identification of the nearest sensitive receivers and relevant construction noise and vibration goals applicable to the SSI; 	Section 2.1
	<ul style="list-style-type: none"> ii. identification of key noise and vibration generating construction activities (based on representative construction scenarios) that have the potential to impact on surrounding sensitive receivers; 	Section 2.2

MCoA	Task Detail	Where addressed
	iii. details on predicted worst-case construction noise impacts, including traffic noise and cumulative noise impacts associated with on-site construction activities and construction of the adjacent proposed HRR project; *	Section 2.2
	iv. identification of all feasible and reasonable measures for minimising construction noise and achieving the relevant noise management goals at sensitive receivers (including construction traffic noise impacts) required by condition E21;	Section 4.1
	v. procedures and mitigation measures to ensure relevant vibration criteria are achieved, including applicable buffer distances for vibration intensive works, use of low-vibration generating equipment/vibration dampeners or alternative construction methodology, and pre- and post- construction dilapidation surveys of sensitive structures where vibration is likely to result in damage to structures;	Section 4.1
	vi. a protocol for minimising the cumulative construction noise and vibration impacts of the SSI and proposed ARTC Hexham Relief Roads project, prepared in consultation with ARTC;*	Not Applicable
	vii. procedures for notifying sensitive receivers of construction activities that are likely to affect their noise and vibration amenity, as well as procedures for dealing with and responding to noise complaints;	Section 4.1
	viii. a safety risk assessment to determine the availability of safe alternatives to ‘beeper’ type reversing or movement alarms on vehicles, plant and equipment used during the construction of the SSI;	Annexure 2
	ix. a program and procedures for construction noise and vibration monitoring indicating monitoring frequency and location, monitoring methods, responsibilities for monitoring and assessment, methods for recording and reporting monitoring results, and procedures to be followed where exceedances of relevant noise and vibration goals are detected; and	Section 5.1
	x. mechanisms for the monitoring, review and amendment of this Plan.	Section 5.3.1

*Reference to the HRR in Condition E63(c)(iii) and (vi) is not applicable as construction of the HRR has been finalised.

1.1 Construction Schedule

The project is expected to be completed over a nominal duration of 6 months from approval. A range of activities with varying noise and vibration impacts are required in that time and these are summarised in Table 1.2.

Table 1.2 Indicative Construction Stages and Scheduling

Construction Phase	Activity	Indicative Schedule
Mobilisation	<ul style="list-style-type: none"> Tarro interchange dilapidation survey Delineation of sensitive areas Site establishment 	December 2019
Civil Earthworks	<ul style="list-style-type: none"> Clear and grub Strip topsoil Prepare and trim subgrade Boxcut spoil Replace topsoil and hydro mulch 	06 January 2020 to 30 April 2020
Remediation	<ul style="list-style-type: none"> PASS neutralisation 	06 January 2020 to 30 April 2020
Rail Pavement	<ul style="list-style-type: none"> Rock layer Structural layer Capping layer 	17 February 2020 to 03 April 2020
Civil Stormwater	<ul style="list-style-type: none"> Installation of box culverts 	06 March 2020 to 15 April 2020
Headwalls	<ul style="list-style-type: none"> Installation of box culverts 	23 March 2020 to 15 April 2020
Track Works	<ul style="list-style-type: none"> Placement of ballast Installation of sleepers and rail Installation of turnouts Tamping Construction of level crossing 	06 April 2020 to 12 May 2020
Demobilisation	<ul style="list-style-type: none"> Site clean-up and demobilisation 	13 May 2020 to 15 May 2020

Construction activities (including the delivery of materials) will be undertaken during standard construction hours. Standard construction hours are defined as:

- a) 7:00 am to 6:00 pm Mondays to Fridays, inclusive; and
- b) 8:00 am to 1:00 pm Saturdays; and
- c) at no time on Sundays or public holidays.

High noise impact activities and works resulting in impulsive or tonal noise emissions (such as rock breaking, rock hammering and pile driving) will only be undertaken:

- a) between the hours of 8:00 am to 5:00 pm Monday to Friday;
- b) between the hours of 8:00 am to 1:00 pm Saturday; and

- c) in continuous blocks not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block;

Except as expressly permitted by an EPL construction activities (including the delivery of materials) outside of the prescribed construction hours may be undertaken in the following circumstances:

- a) construction works where the cumulative air-borne noise generated is:
 - i. no more than 5 dB(A) above the rating background level at any residence in accordance with the *Interim Construction Noise Guideline* (DECC, 2009); and
 - ii. no more than the noise management levels specified in Table 3 of the *Interim Construction Noise Guideline* (DECC, 2009) at other sensitive receivers;
- b) where a negotiated agreement has been reached with affected receivers as the prescribed noise and vibration levels cannot be achieved;
- c) for the delivery of materials required outside these hours by the NSW Police Force, RMS or other authorities for safety reasons;
- d) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm; or works approved through an EPL (including rail possessions) and in accordance with an out-of-hours works procedure.

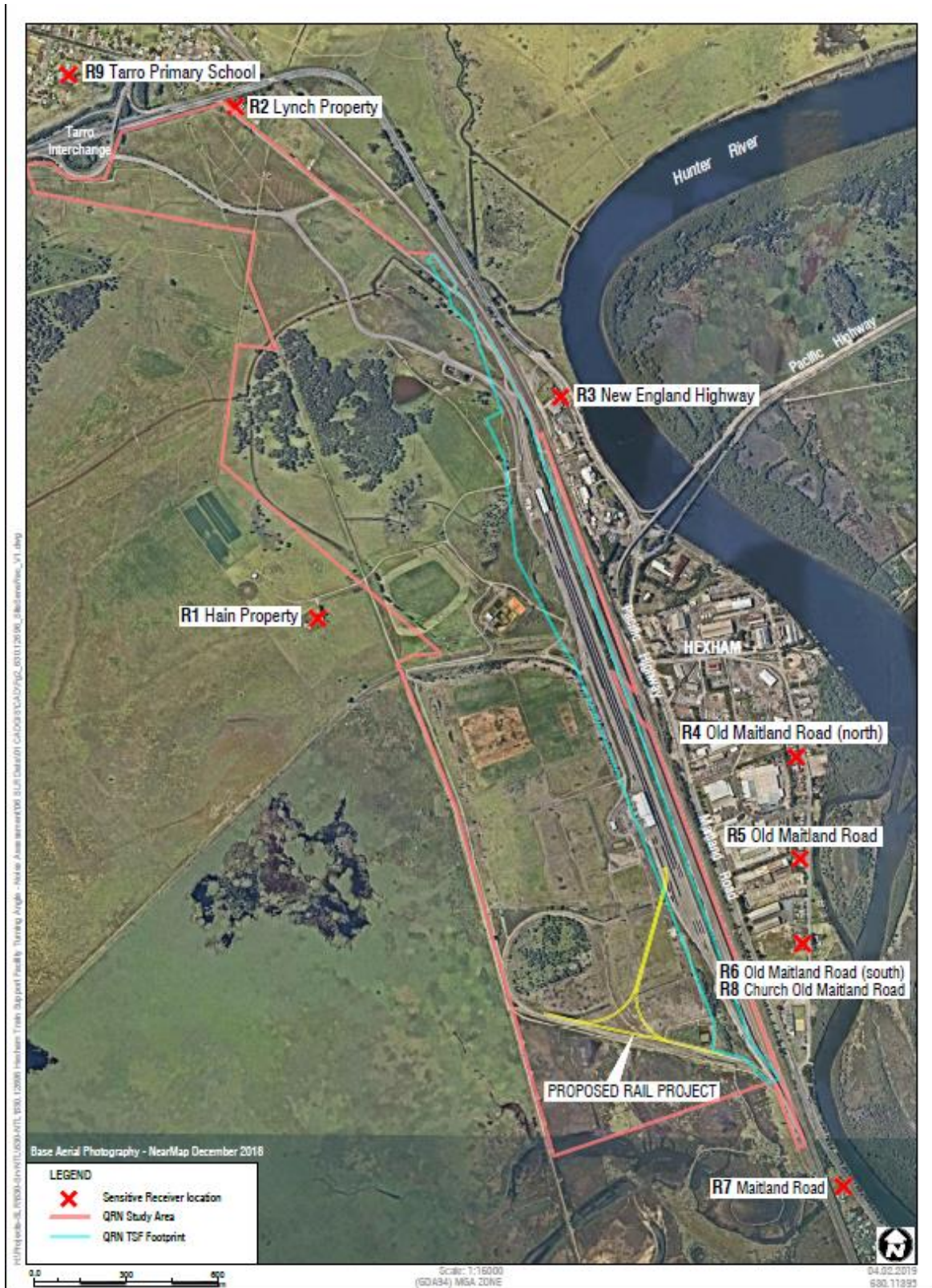
These requirements are committed to in Table 4.1 Work Practices. The Out of Hours Work (OOHW) Protocols are further detailed in Section 4.2.

2.0 Noise Impact Assessment

2.1 Sensitive Receivers

The nearest sensitive receivers potentially affected by the TSF construction are shown on Figure 2.1.

Figure 2.1 Site Locality and Sensitive Receivers



2.2 Noise Management Goals During Construction

Noise emissions from the site will be generated by the simultaneous operation of the TSF and construction of the Turning Angle. Construction noise is likely to consist of machinery movements associated with the activities listed in Table 1.2 but specifically:

- Civil earthworks;
- Laying of rail pavement;
- Construction of civil stormwater and headwalls; and
- Rail construction activities.

The measured background (Rating Background Levels, or RBLs), the calculated noise management goals (as developed through reference to the NSW Noise Policy for Industry (NPfI)), and predicted construction noise levels at the nearest sensitive receivers were modelled by SLR (2019) as Detailed in Table 2.1 below.

Predicted noise management levels in Table 2.1 show that the simultaneous construction of the Turning Angle and operation of the TSF would comply with construction noise goals as determined in accordance with the NPfI for the daytime period at all locations.

Table 2.1 Operational Project Trigger Noise Levels

Receiver ID	Location	Period	Adopted RBL ¹	Project Intrusiveness Criteria LAeq(15minute) ²	Project Amenity LAeq(15minute) ³	Project Trigger Noise Level
R1	Hain Property	Day	41 dBA	46 dBA	58 dBA	46 dBA
		Evening	41 dBA	46 dBA	48 dBA	46 dBA
		Night	41 dBA	46 dBA	43 dBA	43 dBA
R2	Lynch Property	Day	56 dBA	61 dBA	58 dBA	58 dBA
		Evening	53 dBA	58 dBA	48 dBA	48 dBA
		Night	47 dBA	52 dBA	43 dBA	43 dBA
R3	New England Highway	Day	56 dBA	61 dBA	58 dBA	58 dBA
		Evening	53 dBA	58 dBA	48 dBA	48 dBA
		Night	47 dBA	52 dBA	43 dBA	43 dBA
R4	Old Maitland Road (North)	Day	40 dBA	45 dBA	58 dBA	45 dBA
		Evening	40 dBA	45 dBA	48 dBA	45 dBA
		Night	39 dBA	44 dBA	43 dBA	43 dBA
R5	Old Maitland Road	Day	40 dBA	45 dBA	58 dBA	45 dBA
		Evening	40 dBA	45 dBA	48 dBA	45 dBA
		Night	39 dBA	44 dBA	43 dBA	43 dBA
R6	Old Maitland Road (South)	Day	40 dBA	45 dBA	58 dBA	45 dBA
		Evening	40 dBA	45 dBA	48 dBA	45 dBA
		Night	39 dBA	44 dBA	43 dBA	43 dBA
R7	Maitland Road	Day	56 dBA	61 dBA	58 dBA	58 dBA
		Evening	53 dBA	58 dBA	48 dBA	48 dBA
		Night	47 dBA	52 dBA	43 dBA	43 dBA
R8	Church Old Maitland Road	Day	40 dBA	45 dBA	Internal when in use 40 dBA	Internal when in use 40 dBA
		Evening	40 dBA	45 dBA		

Receiver ID	Location	Period	Adopted RBL ¹	Project Intrusiveness Criteria LAeq(15minute) ²	Project Amenity LAeq(15minute) ³	Project Trigger Noise Level
		Night	39 dBA	44 dBA		
R9	Tarro Primary School	Day	56 dBA	61 dBA	Noisiest 1 hour period when in use 35 dBA	Internal Classroom 35 dBA

2. Note: 1. RBL noise levels taken from the EIS NIA.
2. Intrusive criteria is the RBL plus 5dB.
3. Project amenity (15 minute) noise level is the Project Amenity (period) noise level plus 3 dBA
4. Resulting PTNL is the lower of the project intrusive and the project amenity (15 minute) noise levels.

3.0 Vibration Impact Assessment

3.1 Vibration Management Goals During Construction

Vibration will occur during site preparation and track construction. Due to the separation distance between the Turning Angle and the nearest relevant receivers, vibration levels generated by the Turning Angle are likely to fall below the threshold of human perception. The Turning Angle is therefore also expected to fall below the criteria for “minimal risk of cosmetic damage” at surrounding residential and commercial premises.

The adopted construction vibration criteria are provided in Table 3.1 and are based on a conservative application of the German Standard DIN 4150 Part 3- 1999 Structural Vibration in Buildings – Effects on Structures.

Table 3.1 Adopted Construction Vibration Criteria

Line	Type of Structure	Vibration Velocity (mm/s)			
		Foundation Frequency			Plane of Floor of Uppermost Storey
		Less than 10 Hz	10 to 50 Hz	50 to 100* Hz	Frequency Mixture
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that, because of their sensitivity to vibration, do not correspond to those listed in lines 1 and 2 and are of great intrinsic value (e.g. buildings that are under a preservation order).	3	3 to 8	8 to 10	8

* For frequencies above 100Hz, the values specified in this column will be applied.

3.2 Condition Surveys

Pre and post construction dilapidation surveys will be completed on the Tarro Interchange. Condition surveys will involve examining the structure and noting any existing deterioration and damage such as cracking, mortar joints, etc. Where possible, the extent and width of cracks and other forms of deterioration would be marked and a photographic record taken. These records will provide a baseline of existing conditions and indicate any deterioration that may result from the construction activities.

4.0 Environmental Impacts and Controls

4.1 Environmental Control Measures

Table 4.1 below details the specific noise and vibration control measures. The mitigation measures are designed to ameliorate impacts on sensitive receivers. The strategies are based on the recommendations of the EA, the Minister's Conditions of Approval and the Statement of Commitments.

Table 4.1 Environmental Control Measures

Environmental Control Measure	Person Responsible	Timing /Frequency	Completed (initials/date)
Training and Induction			
Provide an induction to site personnel addressing the requirements of this CNVMP and their responsibilities with regard to noise and vibration management.	Contractor	Daily / as required	
Provide education of supervisors, operators and sub-contractors on the need to minimise noise through Toolbox meetings and on site coaching.	Contractor	Daily / as required	
Ensure employees and contractors are appropriately trained in the use of equipment in ways to minimise noise.	Contractor	Daily / as required	
Plant and Equipment			
Equipment will be kept well maintained to prevent unnecessary noise and vibration.	Contractor	Daily	
Construction equipment selected, operated and maintained to minimise noise impacts and where possible fitted with silencers and “smart” reversing alarms.	Contractor	As required	
Ensure all equipment is equipped with noise control (e.g. mufflers, silenced exhausts, acoustic enclosures) and is turned off when not in use.	Contractor	Daily	
Work Practice			
<p>Construction activities associated with the TSF will be undertaken during the following hours unless expressly permitted by an EPL:</p> <ul style="list-style-type: none"> ○ Monday to Friday (inclusive) – 7:00am to 6:00pm ○ Saturday – 8:00am to 1:00pm ○ Sundays and public holidays – No works to be undertaken at any time 	Project Manager	Daily	

Environmental Control Measure	Person Responsible	Timing /Frequency	Completed (initials/date)
<p>Construction works required to be undertaken outside of the standard construction hours are only to be undertaken in the following circumstances:</p> <p>(a) construction works where the cumulative air-borne noise generated is:</p> <p>(i) no more than 5 dB(A) above the rating background level at any residence in accordance with the <i>Interim Construction Noise Guideline</i> (DECC, 2009); and</p> <p>(ii) no more than the noise management levels specified in Table 3 of the <i>Interim Construction Noise Guideline</i> (DECC, 2009) at other sensitive receivers;</p> <p>(b) where a negotiated agreement has been reached with affected receivers as the prescribed noise and vibration levels cannot be achieved;</p> <p>(c) for the delivery of materials required outside these hours by the NSW Police Force, Roads and Maritime Services (RMS) or other authorities for safety reasons;</p> <p>(d) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm; or</p> <p>(e) works approved through an EPL (including rail possessions) and in accordance with an out-of- hours works procedure.</p> <p>Where such works do occur they must be undertaken in accordance with the OOHW Protocol specified in Section 4.2 herein.</p>	Project Manager	Daily	
<p>When high noise impact activities associated with construction must be carried out:</p> <ul style="list-style-type: none"> reasonably in accordance with <i>Interim Construction Noise Guideline</i> (DECC, 2009) and the <i>Australian Standard 2436-1981 'Guide to noise control on construction, maintenance and demolition sites'</i>; using quieter alternative methods than impact or percussion piling, such as bored piles or vibrated piles if such activities are associated with piling; where reasonable and feasible, noisy equipment will be sited behind structures that act as barriers or at the greatest distance from the noise-sensitive areas; in continuous blocks not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block; and a responsible person will maintain liaison between the neighbouring community and the contractor. 	Contractor	Daily	
Implementing additional management measures where noise is found to exceed project specific noise criteria	Contractor	As required	
Regularly grade access roads to reduce noise from trucks rattling.	Contractor	Weekly	

Environmental Control Measure	Person Responsible	Timing /Frequency	Completed (initials/date)
Ensure traffic movement is kept to a minimum, e.g. ensure trucks are fully loaded so that the volume of each delivery is maximised.	Contractor	Daily	
Managing construction vehicle routes and imposing speed restrictions of 40km/hr.	Contractor	Daily	
Where possible, locate construction equipment in a position that provides the most acoustic shielding from buildings and topography.	Contractor	As required	
Equipment will be oriented away from nearby receivers where feasible to minimise noise impacts.	Contractor	As required	
Equipment will be switched off when not in use (including during breaks and down times of more than 30 minutes).	Contractor	As required	
Clustering of noise generating plant is to be avoided to minimise cumulative impacts of multiple noise sources.	Contractor	As required	
In times of adverse weather conditions (e.g. high winds in direction of sensitive receivers or temperature inversions) assess whether any sites and/or equipment need to be shut down to avoid noise impacts at receivers.	Contractor	As required	
Hoardings and temporary noise barriers will be employed where reasonable and feasible to minimise impacts at sensitive receivers.	Contractor	As required	
Vibration			
Dilapidation surveys will be undertaken on the Tarro Interchange prior to commencement of mobilization to site.	Project Manager	Prior to construction commencing	
OOHW are required, and approved, the following ground-borne noise goals will be applied: <ul style="list-style-type: none"> For evening hours (6 pm to 10 pm), 40 dB(A) LAeq (15 min) inside the residence; and For night-time hours (10 pm to 7 am), 35 dB(A) LAeq (15 min) inside the residence. 	Contractor	As required	
Out of Hours Work			
Ensure strict compliance with construction hours. This requirement to be communicated to all project staff through inductions and toolbox meetings.	Project Manager	Daily	
OOHW must only be undertaken following approval of the Environment Representative in	Senior Adviser	Prior to	

Environmental Control Measure	Person Responsible	Timing /Frequency	Completed (initials/date)
accordance with the OOHW Protocols of this CNVMP. These protocols are outlined in Section 4.2.	Environment	construction commencing	
Monitoring			
Upon receipt of a community complaint noise and vibration monitoring shall be undertaken in accordance with methodology outlined in AS2659-1-1998, at the receivers outlined in Section 2.0.	Senior Adviser Environment	As required	
All environmental records including monitoring and complaints records shall be kept for a period of 4 years and produced to an authorised EPA officer on demand.	Project Manager	As required	
The proponent shall nominate an appropriate person to receive, log, track and respond to complaints within the specified timeframes.	Senior Adviser Environment	Prior to construction	
Monitoring will be carried out in response to noise and / or vibration complaints, and where directed by an authorised officer of the Office of Environment and Heritage (OEH).	Senior Adviser Environment	As required	
Ensure site managers regularly check the site for problems such that solutions can be quickly applied.	Contractor	As required	
Reporting and Non-conformance			
Submit reports to the client (and OEH when requested) outlining environmental performance and compliance with the Minister's Conditions of Approval (MCoA).	Senior Adviser Environment	Monthly	
Where an exceedance of noise or vibration criteria is identified, additional mitigation measures shall be implemented where required.	Project Manager	As required	
Community Consultation and Complaint Resolution			
The Community Communications Strategy (CCS) will be implemented for handling noise complaints and community enquiries. The CCS will include procedures for recording, reporting and acting on complaints.	Senior Adviser Environment	Prior to construction	
Complaints and feedback will be managed in accordance with the Aurizon Complaints Management Protocol and recorded on the Aurizon Consultation Manager System (CMS). The complaints management system will be maintained throughout the construction of the project.	Senior Adviser Environment	Prior to construction	

Environmental Control Measure	Person Responsible	Timing /Frequency	Completed (initials/date)
<p>The CMS will record:</p> <ul style="list-style-type: none"> • Date and time of complaint/enquiry. • Type of communication (telephone, letter, meeting, etc.). • Name, address, contact telephone number of complainant/enquirer. • Details of the complaint and enquiry. • Actions taken in response including follow up contact with the complainant. • Any monitoring to confirm that complaints have been satisfactorily resolved. • If no action was taken, the reasons why no action was taken. 	Senior Adviser Environment	As required	
All complaints will be responded to within 24 hours either via actions taken to resolve the complaint or a holding statement while the complaint is being investigated.	Senior Adviser Environment	As required	
Complaints that require immediate action by the Project Manager will be escalated through the Complaints Management Protocol.	Senior Adviser Environment	As required	
Community liaison, including agreements where applicable, will be carried out with local communities and affected residents.	Senior Adviser Environment	Prior to construction and as required	
Letterbox drops and one on one meetings will be carried out to notify sensitive receivers of construction activities that are likely to affect their noise and vibration amenity, and access. Construction activities that may affect residents include night work, temporary loss of access, and where there is high noise generating works carried out by Aurizon.	Project Manager	As required	

4.2 Out of Hours Work (OOHW) Protocols

Certain construction activities will need to be undertaken out of standard work hours for improved safety, access and/or to minimise inconvenience to the community. As per Condition E19 of the Infrastructure Approval, construction works required to be undertaken outside of the standard construction hours are only to be undertaken in the following circumstances.

- a) construction works where the cumulative air-borne noise generated is:
 - I. no more than 5 dB(A) above the rating background level at any residence in accordance with the Interim Construction Noise Guideline (DECC, 2009); and
 - II. no more than the noise management levels specified in Table 3 of the Interim Construction Noise Guideline (DECC, 2009) at other sensitive receivers;
- b) where a negotiated agreement has been reached with affected receivers as the prescribed noise and vibration levels cannot be achieved;
- c) for the delivery of materials required outside these hours by the NSW Police Force, RMS or other authorities for safety reasons;
- d) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm; or
- e) works approved through an EPL (including rail possessions) and in accordance with an out-of-hours works procedure.

In order to undertake work outside the standard working hours (as approved), the following protocols must be followed.

- Step 1: Construction Manager must complete a written application (refer Attachment 1) and lodge with the Environment and Community Manager (ECM) at least 10 days prior to the proposed commencement date.

The application must detail the equipment, location and duration of work proposed. Specify the timing of works, proposed mitigation measures, justify why the work needs to be undertaken after hours and under which MCoA the work complies.
- Step 2: ECM reviews the proposal and qualitatively assesses the likely impacts to sensitive receivers.
- Step 3: If impacts are deemed acceptable and in accordance with condition E19, the ECM will approve the work and specify the required mitigation and/or monitoring. If the ECM deems it unacceptable, it will be referred to the ER for assessment and recommendation.
- Step 4: If approved, the ECM will then notify the sensitive receivers (refer Figure 2.1) of the timing, duration, nature and need for the OOHW.

5.0 Environmental Monitoring and Reporting

5.1 Noise Monitoring

Since noise impacts from construction activities are not expected to exceed project trigger noise levels at any point during construction noise levels will be monitored in response to community complaints only to verify compliance with the noise objectives identified in the MCoA and for comparison with the expected construction noise emissions identified in this CNVMP.

Environmental noise monitoring will be conducted in accordance with AS 1055.1-1997. The results of monitoring will include:

- Date, time and location of monitoring;
- Name of person conducting the monitoring;
- Statistical descriptors to be recorded for 15 minute intervals include Laeq, La10 and La90 levels; and
- Details of site activity, environmental noise characteristics and weather to be noted during monitoring.

All records are to be kept for a period of four years, and will be produced to any authorised officer of OEH upon request.

5.1.1. Exceedance Response

Additional management measures will be implemented when noise exceedances above adopted criteria occur, including:

- Prompt response to any community issue of concern;
- Refinement of on site noise mitigation measures and plant operating procedures where practical;
- Noise monitoring on site and within the community;
- Consideration of acoustical mitigation at receivers; and
- Consideration of negotiated agreements with property holders.

The following additional mitigation measures will be implemented where noise levels are expected to exceed the project noise criteria as specified in Table 2.1.

Table 5.1 Additional Noise Mitigation Measures

Escalation Scale	Measure	Description
1	Letterbox Drop (L)	Letters would be sent to the nearest potentially affected properties notifying them of the proposed noisy works. The letter would outline the types of equipment to be used, timing, duration, mitigation measures and the need. A contact phone number would be provided for receipt of community inquiries.
2	Monitoring (M)	Noise monitoring would be undertaken at the potentially affected sensitive receiver to confirm actual levels.
3	Phone Call (PC)	Potentially affected properties would be contacted by phone to discuss in detail the need and nature of the proposed noisy works and ascertain the impacts to the property. Potential additional mitigation measures would be discussed with a view to satisfying the property owner.
4	Individual Meeting (IM)	Individual meetings with affected receivers would be undertaken by the Environment Manager to discuss the impacts, timing and specific management measures.
5	Respite Offer (RO)	In the event that no suitable mitigation measures can be provided to the satisfaction of an affected resident, respite periods where noisy work would cease would be offered.

Table 5.2 Additional Noise Mitigation Triggers

Time Period	Mitigation Measures			
	Predicted Noise Level Above Criteria			
	0-10dB(A) noticeable	10-20dB(A) Clearly audible	20-30dB(A) Moderately intrusive	30dB(A)+ Highly intrusive
Standard hours	-	-	L, M	L, M, IM
OOHW	L	M, L	L, M, IM, PC	L, M, IM, PC, RO

M = monitoring, IM = individual meeting, L = letterbox drop, PC = phone calls, RO = respite offer

5.2 Vibration Monitoring

Since vibration impacts on both human comfort and building integrity are not anticipated during the construction period, vibration monitoring shall only be carried out in response to community complaint.

This monitoring shall be undertaken in accordance with procedures outlined in Environmental Noise Management Assessing Vibration: A Technical Guideline (DEC, 2006).

5.2.1 Exceedance Response

Should vibration monitoring exceed the criteria specified in Table 3.1, works would cease and alternate construction methods investigated.

If alternate methods to reduce vibration impacts at the sensitive receiver are not practical, negotiations with the affected person(s) would be undertaken to develop acceptable management measures.

5.3 Reporting

Reporting will be undertaken as described in the CEMP. The results of noise and vibration monitoring will be recorded and compared against the project specific criteria identified in this CNVMP. Any complaints or non-compliances will be reported.

6.0 Review and Improvement of the CNVMP

The Senior Adviser Environment will review this Plan and its implementation at least every six months from commencement of construction. The purpose of the review is to ensure that the CEMP and sub-plans and operating system is meeting the project's statutory requirements.

The review will consider:

- Clients, site personnel and agency comments;
- Audit findings;
- Environmental monitoring records;
- Complaints;
- Incident reports;
- Corrective actions taken;
- Environmental non-conformance;
- Changes in organisational structure;
- Changes in construction methodology; and
- Changes in legislation and standards.

The Environment Representative will review the compliance reports and any proposed updates to the CEMP. The Environment Representative has authority to approve/reject minor amendments to this CEMP. Minor amendments are changes that do not have a detrimental effect on the environment or increase the risk profile.

Major changes to the CEMP will require Director-General approval.

7.0 References

- ADW Johnson (2013) Environmental Assessment, NSW Train Support Facility, 16 November 2012, Project No. 37417.
- DEC (2006) Environmental Noise Management Assessing Vibration: A Technical Guideline
- DECC(2009) Interim Construction Noise Guidelines, July 2009
- JBA (2013) Preferred Project Report and Response to Submissions Project Application MP07_0171, Maitland Road, Hexham, PPR NSW Train Support Facility, June 2013, Ref: 12599.
- SLR Consulting Australia (2013) Hexham Train Support Facility Noise Impact Assessment, 26 April 2013, Report No. 30-1858-R2, Revision 7.
- Hexham Train Support Facility – Turning Angle Noise Impact Assessment (SLR, 11 February 2019).

Annexure 1 – Out of Hours Work Application

Out of Hours Work (OOHW) Application Form

Name and Role of Applicant: _____ Date: _____

Date of proposed OOHW: _____

Type of Approval being sought:

Approval is being sought under the following Ministers Condition of Approval (MCoA) (*please tick*):

Ministers Condition of Approval (MCoA) E19	Relevant? (Y/N)
(a) construction works where the cumulative air-borne noise generated is: (i) no more than 5 dB(A) above the rating background level at any residence in accordance with the <i>Interim Construction Noise Guideline</i> (DECC, 2009); and (ii) no more than the noise management levels specified in Table 3 of the <i>Interim Construction Noise Guideline</i> (DECC, 2009) at other sensitive receivers;	
(b) where a negotiated agreement has been reached with affected receivers as the prescribed noise and vibration levels cannot be achieved;	
(c) for the delivery of materials required outside these hours by the NSW Police Force, RMS or other authorities for safety reasons;	
(d) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm;	
(e) works approved through an EPL (including rail possessions) and in accordance with an out-of-hours works procedure.	

Description of OOHW:

Location of work (including access and equipment): map attached? Y / N

(section/chainage and mark on map)

Equipment:

Details of times and duration of OOHW being requested:

Justification for OOH (why this work CANNOT be completed during standard construction hours)

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Approval:

Reviewed by:	Date:
Approved by:	Date:
Notification requirements: Letter required (Y/N): Send/contact by date: Distribution:	
Additional requirements:	
Completed by:	Date:

Annexure 2 – Risk Assessment

2	Construction Noise and Vibration	A) Vibration and noise impacts to sensitive receivers originating from construction activities exceeding performance criteria.	<p>Elimination</p> <p>Not applied</p> <p>Substitution</p> <p>Not applied</p> <p>Isolation</p> <p>Not applied</p> <p>Engineering</p> <p>A) Equipment is well maintained and operated per manufacturers requirements.</p> <p>A) Equipment fit with noise control fittings where practical.</p> <p>A) Vehicles to be fitted with “broadband” reversing alarms (Quackers) to reduce offensive noise.</p> <p>Administration</p>	<p>Guidance:</p> <p>The selected HOC is justified on the basis that the controls form part of the accepted safe system of work for the known operating environment and have valid potential to minimise the identified risk.</p> <p>All credible control options were considered within the hierarchy of control (HOC) as applicable to the accountable sphere of control.</p>	2	2	L	<p>Elimination</p> <p>Not applied</p> <p>Substitution</p> <p>Not applied</p> <p>Isolation</p> <p>Not applied</p> <p>Engineering</p> <p>Not applied</p> <p>Administration</p> <p>Not applied</p> <p>PPE</p> <p>Not applied</p> <p>Control Effectiveness:</p> <p>SE</p>	<p>Guidance:</p> <p>Risk Controls are subject to ongoing due diligence in accordance with the authorised implementation and review timeframes.</p>	Project Manager and Principal Contractor		02/12/2020
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			<p>A) Minimise number of plant operating at any one time.</p> <p>A) Machinery turned off when not in use.</p> <p>A) Community liaison (agreements where applicable) with local communities and affected residents.</p> <p>A) Respite periods for noisy activities (in accordance with regulatory guidelines)</p> <p>A) Implementing management measures where regenerated noise is found to be excessive and agreements are not in place.</p> <p>A) Monitoring will be undertaken in response to noise and vibration complaints or as directed by the EPA in accordance with AS2659 – 1-1998, at the relevant receivers.</p> <p>A) Where an exceedance of adopted noise or vibration criteria is identified, additional management measures are to be investigated</p>	<p>Controls considered but rejected:</p> <p>NIL</p>							
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			<p>and implemented.</p> <p>A) Corrective actions are to be handled in accordance the CEMP and NVMP.</p> <p>A) Establish and maintain complaints management system.</p> <p>A) Building condition reports on potentially impacted structures (Tarro Interchange).</p> <p>A) Construction will occur during daytime hours (0700 to 1800) Monday – Friday and 0800 to 1300 Saturday where practical. Outside of these hours an Out of Hours Work Protocol will be required to be approved.</p> <p>A) Construction Environmental Management Plan and Noise and Vibration Management Plan.</p> <p>PPE</p> <p>Not applied.</p> <p><u>Control Effectiveness:</u></p>						
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