



Noise and Vibration Management Plan

Parkes to Narromine Inland Rail Project

Project # 808 – J013

A background image showing a perspective view of railway tracks receding into the distance. The tracks are set on gravel ballast. A large, semi-transparent 'INLink' watermark is overlaid across the bottom half of the image. The overall color palette is dominated by yellow and brown tones, with a large yellow circular graphic element on the right side of the page.

Job No.: 808 - J013

Principal: Australian Rail Track Corporation, (ARTC)

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Noise and Vibration Management Plan (NVMP)

Parkes to Narromine Inland Rail Project # 808 – J013

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Attachments

Attachment A – Sensitive Receiver Location Maps

Glossary of Terms

Term	Definition
AS/NZS ISO 31000:2009	The Australian and New Zealand Standard for Risk Assessments
AS IEC 61672.1 2004	Electroacoustic – Sound Level Meters – Specifications
CEMF	Construction Environmental Management Framework
CEMP	Construction Environmental Management Plan
CNVIS	Construction Noise and Vibration Impact Statement
CoA	Conditions of Approval
CSSI	Critical State Significant Infrastructure
dB(A)	Unit used to measure 'A-weighted' sound pressure levels
DP&E	Department of Planning and Environment
EIS	Environmental Impact Statement
EPA	Environmental Protection Authority
EPL	Environmental Protection Licence
ER	Environmental Representative
ICNG	<i>Interim Construction Noise Guideline</i> (DECC 2009)
INP	<i>Industrial Noise Policy</i> (EPA 2000)
L_{eq} (Time)	Equivalent sound pressure level
L_w	Adopted sound power level, calculated using the loudest two items of equipment
NVMP	Noise and Vibration Management Plan
OOHW	Out of hours works
P2N	Parkes to Narromine
RBL	Rating background level
VDV	Vibration Dose Values

1. Scope

1.1 Purpose

This Noise and Vibration Management Plan (NVMP) focuses on potential noise and vibration impacts from construction activities during the construction phase of the Inland Rail Parkes to Narromine (P2N) project (the Project) which will be undertaken by INLink (the Contractor). Impacts associated with the ongoing operation of the Project are not considered in this plan. This NVMP addresses the management requirements related to noise and vibration during construction and has been prepared in consultation with the Environmental Protection Authority (EPA) and relevant Councils in accordance with the Conditions of Approval (CoA) and the Inland Rail NSW Construction Noise and Vibration Management Framework. The CoA will take precedence where there are inconsistencies between the CoA and the Inland Rail NSW Construction Noise and Vibration Management Framework.

The Environmental Management System (EMS) and Project overview are outlined in Section 1 of the Construction Environmental Management Plan (CEMP). This NVMP will be submitted to DP&E along with, or subsequent to, the submission of the CEMP.

2. Objective

2.1 Environmental Objectives

Best practice construction noise and vibration control measures, as well as relevant regulatory authorities regulations, guidelines and the CoA have been employed to minimise the impact of construction activities.

The following objectives will apply to the construction phase of the Project:

- Employ appropriate measures to comply with all relevant legislation, licences and other requirements
- Employ appropriate measures to minimise environmental or social impact due to noise or vibration
- Undertake construction activities to avoid and / or minimise impacts related to noise and vibration, including:
 - Ensuring plant and equipment are operated appropriately
 - Educate worksite personnel on noise minimising practices.
- Avoid potential risks to health or amenity from construction-generated noise or vibration
- Avoid structural damage to buildings and heritage buildings during construction
- Undertake active community engagement and complaints handling
- Ensure compliance with the CoA
- Ensure compliance with the mitigation measures in the Environmental Impact Statement (EIS) (GHD 2017), submissions report, as amended or modified by the CoA
- Ensure compliance with the Inland Rail NSW Construction Noise & Vibration Management Framework, as relevant to the CoA

2.2 Environmental Targets

The following environmental performance targets will be implemented throughout the NVMP:

- Compliance with CoA, EPL, EIS and submissions report as amended by the CoA
- Controlling noise and vibration at the source, on the source to receiver transmission path and the receiver
- Meeting the specific noise levels and vibration criteria, as specified in the CoA and EPL.

3. References

3.1 Key Legislative Requirements

Legislation applicable to the Project regarding noise and vibration, include but is not limited to the following:

- *Environmental Planning and Assessment Act 1979 (NSW)*
- *Protection of the Environment Operations Act 1997 (NSW)*.

3.2 Standards and Guidelines

Standards and guidelines applicable to the Project relating to noise and vibration, include but are not limited to the following:

- Inland Rail NSW Construction Noise & Vibration Management Framework (ARTC 2018)
- Environmental Noise Management Manual (RTA 2001)
- NSW Industrial Noise Policy (EPA 2000)
- AS 1055.1-1997 Acoustics – Description and measurement of environmental noise
- AS 2436–2010 Guide to noise and vibration control on construction, demolition and maintenance sites
- AS IEC 61672.1 2004 'Electroacoustic - Sound Level Meters – Specifications
- Transit noise and vibration impact assessment (USA Federal Transit Administration 2006)
- NSW Road Noise Policy (RNP) (DECCW 2011)
- Interim Construction Noise Guideline (DECC 2009)
- Assessing Vibration: A Technical Guideline (DEC 2006) (for human exposure)
- British Standard (BS) 6472-1992, Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)
- BS 5228.2-2009, Code of Practice Part 2 Vibration for noise and Vibration on Construction and Open Sites – Part 2: Vibration
- BS 7385 Part 2-1993 - Evaluation and measurement for vibration in buildings Part 2
- German Standard DIN 4150-3: 1999-02 Structural Vibration – Part 3: Effects of Vibration on Structures.

3.3 State and Commonwealth Approval Requirements

Under Part 5.1 of the NSW Environmental Planning and Assessment Act, a declared Critical State Significant Infrastructure (CSSI) project is assessed and must be approved by the Minister for Planning. Table 3-1 outlines the Conditions of Approval (CoA) (June 2018) for the Project from the NSW Department of Planning and Environment (DP&E) related to noise and vibration during the Project.

The Protection of Environment Operations (*POEO*) Act 1997 outlines requirements to prevent noise and vibration impacts and stipulates offences and penalties applicable to those identified. These

conditions form the Environment Protection Licence (EPL) No. 21138 and those related to the preparation of an NVMP are outlined in Table 3-1 below.

Table 3-1 – Conditions of Approval

CoA	Details	Where addressed	How addressed
A5	Where the terms of this approval require a document to be prepared or a review to be undertaken in consultation with identified parties, consultation must be carried out in accordance with the Communications Strategy required by Condition B1. Evidence of the consultation undertaken must be submitted to the Secretary with the document.	Section 3.6	Consultation has been carried out with Parkes Shire Council, Environment Protection Authority (EPA), Narromine Shire Council and the ER.
A5a)	The evidence must include: Documentation of the engagement with the party (ies) identified in the condition for approval that has occurred prior to submitting the document for approval.	Section 3.6	Consultation has been carried out with Parkes Shire Council, EPA, Narromine Shire Council and the ER.
A5b)	The evidence must include: A log of the points of engagement or attempted engagement with the identified party (ies) and a summary of the issues raised by them.	Section 3.6	The log of comments from Parkes Shire Council, EPA, Narromine Shire Council and the ER is identified within Table 3-5.
A5c)	The evidence must include: Documentation of the follow-up with the identified party (ies) where feedback has not been provided to confirm that they have none or have failed to provide feedback after repeated requests.	Section 3.6	Feedback from Parkes Shire Council, EPA, Narromine Shire Council and the ER is identified within Table 3-5.
A5d)	The evidence must include: An outline of the issues raised by the identified party(ies) and how they have been addressed.	Section 3.6	Issues raised from Parkes Shire Council, EPA, Narromine Shire Council and the ER is addressed within Table 3-5.
A5e)	The evidence must include: A description of the outstanding issues raised by the identified party(ies) and the reasons why they have not been addressed.	Section 3.6	Issues raised from Parkes Shire Council, EPA, Narromine Shire Council and the ER is addressed within Table 3-5.

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CoA	Details	Where addressed	How addressed
A19d)	<p>For the duration of the works until the completion of construction, the approved ER must:</p> <p>Review documents identified in Conditions C1, C4, and C13 and any other documents that are identified by the Secretary, to ensure they are consistent with requirements in or under this approval and if so:</p> <p>make a written statement to this effect before submission of such documents to the Secretary (if those documents are required to be approved by the Secretary); or</p> <p>make a written statement to this effect before the implementation of such documents (if those documents are required to be submitted to the Secretary / Department for information or are not required to be submitted to the Secretary / Department)</p>	Section 5.12	<p>The ER has reviewed the identified documents.</p> <p>The works as described in this NVMP will not commence until approval is received from DP&E.</p>
A19e)	<p>For the duration of the works until the completion of construction, the approved ER must:</p> <p>Regularly monitor the implementation of the document listed in Conditions C1, C4 and C13 to ensure implementation is being carried out in accordance with the document and the terms of this approval.</p>	Section 5.7	Inspections and audits will be undertaken in accordance with this condition, as outlined in Section 5.7.
E1	<p>Works must be undertaken during the following hours:</p> <p>(a) 7:00 am to 6:00 pm Mondays to Fridays.</p> <p>(b) 8:00 am to 1:00 pm Saturdays.</p> <p>(c) at no time on Sundays or public holidays.</p>	Section 5.1.1	Construction activities will be undertaken during the approved construction hours as outlined in Section 5.1.1.
E2	Notwithstanding Condition E1, works affecting any one receiver may be undertaken during the hours of 6.00 am to 6.00 pm each day over a three (3) month period provided that there is no work between the hours of 1:00 pm on a Saturday and 7:00 am on a Monday every alternate week.	Section 5.1.1	Works affecting any one receiver may be undertaken during the specified hours in Section 5.1.1.
E3	<p>Notwithstanding Conditions E1 and E2, works associated with the CSSI may be undertaken outside the hours specified under those conditions in the following circumstances:</p> <p>(a) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or</p> <p>(b) where it is required in an emergency to avoid injury or the loss of life,</p>	Section 5.1.2	Works may be undertaken outside the hours specified under the circumstances outlined in Section 5.1.2.

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CoA	Details	Where addressed	How addressed
	<p>to avoid damage or loss of property or to prevent environmental harm; or</p> <p>(c) where different construction hours are permitted under an Environmental Protection Licence (EPL) in force in respect of the CSSI; or</p> <p>(d) where a negotiated agreement is in force, in accordance with Condition E4 and E5; or</p> <p>(e) construction that causes LAeq (15 minute) noise levels:</p> <p>i) no more than 5 dB(A) above the rating background level at the façade of any residence in accordance with the Interim Construction Noise Guideline (DECC, 2009) or if between the hours of 10:00 pm and 7:00 am no more than 52 dB(A) LA (Max) or more than 15 dB(A)LA(Max) above the rating background level whichever is the higher, and</p> <p>ii) no more than the noise management levels specified in Table 3 of the Interim Construction Noise Guideline (DECC, 2009) at other sensitive land uses, and</p> <p>iii) continuous or impulsive vibration values, measured at the most affected residence are no more than those for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC 2006), and</p> <p>iv) intermittent vibration values measured at the most affected residence are no more than those for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC 2006).</p>		
E4	The Proponent may reach negotiated agreements with sensitive receivers (owners and occupiers) to carry out works in accordance with the hours and noise limits specified in the negotiated agreements	Section 5.1.1	Negotiated agreements may be allowed to carry out works in accordance with the hours and noise limits specified in the negotiated agreements, as outlined in Section 5.1.1
E5	All negotiated agreements must be in writing and finalised before the commencement of works.	Section 5.1.1	Negotiated agreements will be recorded with the ARTC Community and Stakeholder Consultation System, as outlined in Section 5.1.1.

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CoA	Details	Where addressed	How addressed
E6	<p>On becoming aware of the need for emergency works in accordance with Condition E3(b), the Proponent must notify the Department in writing to compliance@planning.nsw.gov.au, ER and the EPA of the need for that work.</p> <p>The Proponent must use best endeavours to notify all affected sensitive receivers of the likely impact and duration of those works</p>	Section 5.11	Appropriate departments and regulators will be notified of any emergency works occurring as outlined in Section 5.11.
E7	<p>Except as permitted by an EPL, activities resulting in impulsive or tonal noise emissions must only be undertaken:</p> <p>(a) between the hours of 8:00 am to 6:00 pm Monday to Friday.</p> <p>(b) between the hours of 8:00 am to 1:00 pm Saturday.</p> <p>(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> <p>For the purpose of this condition, 'continuous' includes any period during which there is less than a 1-hour respite between ceasing and recommencing any works that are the subject of this condition.</p>	Section 5.1.1	Activities resulting in impulsive or tonal noise emissions will only be undertaken during the hours as outlined in Section 5.1.1.
E8	<p>Mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration criteria:</p> <p>(a) construction 'Noise affected' noise management levels established using the Interim Construction Noise Guideline (DECC, 2009).</p> <p>(b) vibration criteria established using the Assessing Vibration: A Technical Guideline (DEC 2006) (for human exposure).</p> <p>(c) Australian Standard AS 2187.2 - 2006 "Explosives - Storage and Use - Use of Explosives".</p> <p>(d) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions".</p> <p>(e) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures (for structural damage).</p> <p>Any works identified as exceeding the noise management levels and/or vibration criteria must be managed in accordance with the Construction Noise and Vibration Management Sub-plan required by Condition</p>	Section 3.2 Section 4.5	<p>The relevant noise and vibration standards and guidelines are listed in Section 3.2.</p> <p>Section 4.5 outlines the noise levels and the vibration criteria in accordance with this CoA.</p>

CoA	Details	Where addressed	How addressed
	<p>C4(b).</p> <p>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 Level.</p>		
E9	<p>Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage must be notified before construction that generates vibration commences in the vicinity of those properties. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owner and occupiers are to be provided a schedule of potential exceedances for the duration of the potential exceedances, unless otherwise agreed by the owner and occupier. These properties must be identified and considered in the Construction Noise and Vibration Management Sub-plan required by Condition C4(b).</p>	Section 5.2	<p>Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage will be notified before construction that generates vibration commences in the vicinity of those properties, as outlined in Section 5.2.</p>
E10	<p>This approval does not permit blasting.</p>	Section 5.1	<p>Mitigation measure, NV21, in Section 5.1 states the following:</p> <p>"Blasting will not be undertaken at any time."</p>
E65	<p>The Proponent must undertake dilapidation surveys on the current condition of surface and sub-surface structures owned by third parties and identified at risk from vibration. The dilapidation surveys must be prepared by a suitably qualified and experienced person(s).</p>	Section 5.4.2.1	<p>Prior to commencing activities, dilapidation surveys will be undertaken on the current condition of surface and sub-surface structures owned by third parties and identified as being at risk of structural damage from vibration causing activities during the construction phase of the Project, as outlined in Section 5.4.2.1.</p>
E66	<p>The results of the dilapidation surveys must be provided to the relevant owners of surface and sub-surface structure for review prior to the commencement of potentially impacting works.</p>	Section 5.4.2.1	<p>Results of the dilapidation surveys will be provided to the relevant owners for review prior to the commencement of potentially impacting works, as outlined in Section 5.4.2.1.</p>

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CoA	Details	Where addressed	How addressed
E67	Subsequent dilapidation surveys must be undertaken to assess damage to the surface and sub-surface structures that may have resulted from the construction of the CSSI within three months of the completion of construction, unless otherwise agreed by the Secretary.	Section 5.4.2.1	Subsequent dilapidation surveys will be undertaken, as outlined in Section 5.4.2.1.
E68	The results of the subsequent dilapidation surveys for each surface and sub-surface structure surveyed must be provided to the relevant owners of the structures within one (1) month of undertaking the surveys.	Section 5.4.2.1	The results of the subsequent dilapidation surveys will be provided to the relevant owners of the structures as, outlined in Section 5.4.2.1.
E69	The Proponent must carry out rectification at its expense and to the reasonable requirements of the surface and sub-surface structure owner(s) within three (3) months of completion of the post-dilapidation surveys unless otherwise agreed with the owner of the affected surface and sub-surface structure.	Section 5.4.2.1	Assessments will be undertaken by the Environmental Manager and suitably qualified and experienced person(s) to determine whether rectifications are to be carried out, as outlined in Section 5.4.2.1.
C4	The following CEMP Sub-plans must be prepared in consultation with the relevant government agencies and relevant councils identified for each CEMP Sub-plan and be consistent with the CEMP referred to in the EIS.	Section 3.6	This NVMP has been developed in consultation with the EPA and the relevant Councils, as outlined in Section 3.6.
C5 a)	The CEMP Sub-plans must state how the environmental performance outcomes identified in the EIS and Submissions Report, as modified by these conditions will be achieved.	Section 2.2 Section 5	The environmental performance outcomes and targets are outlined in Section 2.2 and will be achieved through the measures presented in Section 5.
C5 b)	The mitigation measures identified in the EIS and Submissions Report, as modified by these conditions will be implemented.	Section 5.1	The mitigation measures relevant to noise and vibration are outlined in Section 5.1.
C5 c)	The relevant terms of this approval will be complied with.	This plan	This condition will be demonstrated through the implementation and preparation of this NVMP.

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CoA	Details	Where addressed	How addressed
C5 d)	Issues requiring management during construction, as identified through ongoing environmental risk analysis, will be managed.	Section 4.2	<p>The environmental risk assessment is outlined in Section 4.2 and describes the construction activities and predicted sound levels for each task.</p> <p>The on-going risk assessment for the Project is outlined in the CEMP and includes a risk register for the construction activities associated with the Project.</p>
C6	The CEMP Sub-plans must be endorsed by the ER and then submitted to the Secretary for approval no later than one (1) month before the commencement of the construction activities to which they apply.	Section 3.6 CEMP	<p>This NVMP will be approved by DP&E in accordance with this condition before the commencement of construction activities, as outlined in Section 3.6.</p> <p>This NVMP has been endorsed by the ER. Refer to CEMP for the ER endorsement letter.</p>
C7	Any of the CEMP Sub-plans may be submitted to the Secretary along with, or subsequent to, the submission of the CEMP.	Section 3.6	This NVMP will be submitted to DP&E along with, or subsequent to, the submission of the CEMP.
C12	Construction must not commence until the CEMP and all CEMP Sub-plans have been approved by the Secretary. The CEMP and CEMP Sub-plans, as approved by the Secretary, including any minor amendments approved by the ER, must be implemented for the duration of construction. Where the CSSI is being staged, construction of that stage is not to commence until the relevant CEMP and sub-plans have been endorsed by the ER and approved by the Secretary.	Section 3.6	<p>As outlined in Section 3.6, construction will not commence until this NVMP has been approved by DP&E.</p> <p>This NVMP, as approved by DP&E, including any minor amendments approved by the ER, will be implemented for the duration of construction.</p>

CoA	Details	Where addressed	How addressed						
C13	<p>The following Construction Monitoring Program must be prepared in consultation with the relevant government agencies and relevant councils identified for the Construction Monitoring Programs to compare actual performance of construction of the CSSI against performance predicted performance.</p> <table border="1"> <thead> <tr> <th></th> <th>Required Construction Monitoring Programs</th> <th>Relevant government authorities to be consulted for each Construction Monitoring Program</th> </tr> </thead> <tbody> <tr> <td></td> <td>Noise and vibration</td> <td>EPA and relevant councils</td> </tr> </tbody> </table>		Required Construction Monitoring Programs	Relevant government authorities to be consulted for each Construction Monitoring Program		Noise and vibration	EPA and relevant councils	Section 3.6	The Construction Monitoring Program has been prepared in consultation with the EPA and relevant Councils, as outlined in Section 3.6.
	Required Construction Monitoring Programs	Relevant government authorities to be consulted for each Construction Monitoring Program							
	Noise and vibration	EPA and relevant councils							
C14 a)	<p>Each Construction Monitoring Program must provide:</p> <p>Details of baseline data available;</p>	Section 4.1 Section 4.5.1	<p>As stated in Section 4.1 and 4.5.1, both attended and unattended noise monitoring was undertaken at various locations during the EIS.</p> <p>As stated in Section 4.1 and 4.5.2, unattended vibration monitoring was undertaken during the EIS with a vibration logger set up approximately 15m from the existing rail line.</p>						
C14 b)	Details of baseline data to be obtained and when;	Section 5.4	Baseline data is to be obtained for noise and vibration in the Construction Monitoring Program.						
C14 c)	Details of all monitoring of the project to be undertaken	Section 5.4	The details of the noise and vibration monitoring to be undertaken during construction is outlined in Section 5.4.						
C14 d)	The parameters of the project to be monitored;	Section 4.5 Section 5.4	Section 4.5 sets out the noise levels and vibration criteria for the Project during construction.						

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CoA	Details	Where addressed	How addressed
C14 e)	The frequency of monitoring to be undertaken;	Section 5.4	Noise and vibration monitoring will occur at each of the specified locations, as outlined in Section 5.4.
C14 f)	The location of monitoring;	Section 5.4	The locations of monitoring will be consistent with the monitoring conducted in the EIS.
C14 g)	The reporting or monitoring and analysis results against relevant criteria;	Section 5.4	The reporting of the results against relevant criteria will occur as outlined in Section 5.4
C14 h)	Procedures to identify and implement additional mitigation measures where results of monitoring are unsatisfactory and;	Section 5.4.3	Section 5.6 outlines the procedure in the event of a noise level and vibration criteria exceedances.
C14 i)	Any consultation to be undertaken in relation to the monitoring programs.	Section 3.6. Section 5.4	A Construction Monitoring Program for noise and vibration has been developed and consultation has been undertaken with the EPA and relevant Councils.
C15	The Construction Monitoring Program must be endorsed by the ER and then submitted to the Secretary for approval at least one (1) month before commencement of construction.	Section 5.4 Section 7.4 -CEMP	The Construction Monitoring Program is endorsed by the ER. Refer to the CEMP for the ER Endorsement Letter. The Construction Monitoring Program will be submitted to DP&E before commencement of construction.

CoA	Details	Where addressed	How addressed
C16	A construction activity must not commence until the Secretary has approved all of the required Construction Monitoring Programs relevant to that activity, and all the necessary baseline data for the monitoring program has been collected.	Section 5.4	Construction activities, involving noise and vibration, will not commence until DP&E has approved the Construction Monitoring Program relevant noise and vibration, and all the necessary baseline data for the monitoring program has been collected.
C17	The Construction Monitoring Programs, as approved by the Secretary including any minor amendments approved by the ER, must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Secretary, whichever is the greater.	Section 5.4	The Construction Monitoring Program will be implemented for the duration of the Project, as outlined in Section 5.4.
C18	The results of the Construction Monitoring Programs must be submitted to the Secretary, and relevant government agencies and councils, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.	Section 5.4 Section 7.4 - CEMP	The results of the Construction Monitoring Program will be in the form of a Construction Monitoring Report and will be provided at the frequency required by the Construction Monitoring Program, as outlined in Section 5.4.
C19	Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.	Section 5.4	The relevant Construction Monitoring Program for noise and vibration is incorporated into this NVMP in Section 5.4.

Table 3-2 – Environment Protection Licence

Ref ID	Details	Where addressed
A3.1	Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.	CEMP and Sub Plans

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Ref ID	Details	Where addressed									
L3.1	<p>Works must be undertaken during the following hours:</p> <ul style="list-style-type: none"> a) 7:00 am to 6:00 pm Mondays to Fridays b) 8:00 am to 1: 00 pm Saturdays; and c) at no time on Sundays or public holidays 	Section 5.1.1									
L3.2	<p>Notwithstanding Condition L3.1 works affecting any one receiver may be undertaken during the hours of 6:00 am to 6:00 pm each day over a 3 month period provided that there is no work between the hours of 1:00 pm on a Saturday and 7:00 am on a Monday every alternate week.</p>	Section 5.1.1									
L3.3	<p>Notwithstanding Condition L3.1 and L3.2, works associated with the Critical State Significant Infrastructure (CSSI) may be undertaken outside the hours specified under those conditions in the following circumstances;</p> <ul style="list-style-type: none"> a) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or b) where it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm; or c) where different construction hours are permitted under an EPL in force in respect of the CSSI; or d) where a negotiated agreement is in force, in accordance with Condition L3.5 and L3.6; or e) construction that causes LAeq(15 min) noise levels no more than the noise management levels specified in Table 3 of the 'Interim Construction Noise Guideline (DECC 2009) at other sensitive land uses; or f) construction that causes continuous or impulsive vibration values, measured a the most affected residence are no more than those for human exposure to vibration, specified in Table 2.2 of 'Assessing Vibration: a technical guideline (DEC 2006); or g) construction that causes intermittent vibration values measured a the most affected residence are no more than those for human exposure to vibration, specified in Table 2.4 of 'Assessing Vibration: a technical guideline (DEC 2006). 	Section 5.1.2									
L3.4	<p>Hours of operation and noise limits:</p> <table border="1"> <thead> <tr> <th>Period</th> <th>Land Use</th> <th>Noise Limit</th> </tr> </thead> <tbody> <tr> <td>6:00 pm to 7:00 am Monday to Friday 1:00 pm to 8:00 am Saturday</td> <td>Classrooms at schools and other educational institutions</td> <td>Internal noise level 45 dB (A)</td> </tr> <tr> <td></td> <td>Active recreation areas (characterised by sporting activities and activities which generate their own noise of focus for</td> <td>External noise level 65 dB (A)</td> </tr> </tbody> </table>	Period	Land Use	Noise Limit	6:00 pm to 7:00 am Monday to Friday 1:00 pm to 8:00 am Saturday	Classrooms at schools and other educational institutions	Internal noise level 45 dB (A)		Active recreation areas (characterised by sporting activities and activities which generate their own noise of focus for	External noise level 65 dB (A)	Section 4.5.1
Period	Land Use	Noise Limit									
6:00 pm to 7:00 am Monday to Friday 1:00 pm to 8:00 am Saturday	Classrooms at schools and other educational institutions	Internal noise level 45 dB (A)									
	Active recreation areas (characterised by sporting activities and activities which generate their own noise of focus for	External noise level 65 dB (A)									

Ref ID	Details			Where addressed
		participants, making them less sensitive to external noise intrusion)		
		Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External noise level 60 dB (A)	
		Community centres	Depends on the intended use of the centre. Refer to the recommended 'maximum' internal levels in AS2107 for specific uses.	
	06:00 pm to 10:00 am On any other day	All other receivers (defined as those receivers not listed above)	LAeq(15 min) noise levels not greater than 5 dB(A) above the rating background level at the façade of any residence in accordance with the Interim Construction Noise Guidelines (DECC 2009).	
	10:00 pm to 07:00 am On any other day	All other receivers (defined as those receivers not listed above)	LAeq(15 min) noise levels not greater than 5 dB(A) above the rating background level at the façade of any residence in accordance with the Interim Construction Noise Guidelines (DECC 2009) or if between the hours of 10:00pm and 07:00am no more than 52 dB (A) LA (MAX) or the prevailing RBL plus 15 dB (A) L A (MAX), whichever is the higher.	
L3.5	<p>The licensee may undertake works outside of standard construction hours if agreement between the licensee and a substantial majority of potentially affected sensitive receivers has been reached.</p> <p>Any agreement (s) between the licensee and the potentially affected noise sensitive receivers must be recorded in writing and a copy of the agreement (s) kept on the premises by the licensee for the duration of this licence.</p>			Section 5.1.1

Ref ID	Details	Where addressed
L3.6	All negotiated agreements must be in writing and finalised before the commencement of works.	Section 5.1.1
L3.7	<p>Except as permitted by this licence, activities resulting in impulsive or tonal noise emissions must only be undertaken</p> <ul style="list-style-type: none"> a) between the hours of 8:00 am to 6:00 pm Monday to Friday. b) between the hours of 8:00 am to 1:00 pm Saturday. 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 purpose of this condition, 'continuous' include any period during which there is less than a one hour respite between ceasing and recommencing any works that are the subject of this condition.</p> <p>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 Level.</p>	Section 5.1.1
L3.8	All works and activities must be undertaken in a manner that will minimise noise and vibration impacts on sensitive receivers. The licensee must implement all feasible and reasonable noise and vibration abatement measures at the premises to minimise noise and vibration impacts on noise sensitive receivers, in accordance with the Interim Construction Noise Guideline.	Section 5.1
O5.2	<p>Unless otherwise specified by another condition of this licence, high noise impact works and activities must only be undertaken:</p> <ul style="list-style-type: none"> a) between the hours of 8:00 am to 6:00 pm Monday to Friday. b) between the hours of 8:00 am to 1:00 pm Saturday. 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 purpose of this condition, 'continuous' include any period during which there is less than a one hour respite between ceasing and recommencing any works that are the subject of this condition.</p>	Section 5.1.1
O5.3a	The licensee must notify affected noise sensitive receivers of works approved outside of standard construction hours not less than 5 days and not more than 14 days before those works are to be undertaken.	Section 5.2

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Ref ID	Details	Where addressed
O5.3b	<p>The notification must be:</p> <ul style="list-style-type: none">• by letterbox drop or email• be detailed on the project website. <p>The notification required by paragraphs (a) and (b) of this condition must:</p> <ul style="list-style-type: none">• clearly outline the reason that the work is required to be undertaken outside the hours specified in Condition L3.1• include a diagram that clearly identified the location of the proposed works in relation to nearby cross streets and local landmarks• include details of relevant time restrictions that apply to the proposed works• clearly outline, in plain English, the location, nature, scope and duration of the proposed works• detail the expected noise impact of the sensitive receivers• clearly state how complaints may be made and additional information obtained• include the number of the telephone complaints line require by Condition M3.1, an after hours contact phone number specific to the works undertaken outside the hours specified in Condition L3.1, and the project website address.	Section 5.2
M1.1	<p>The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.</p>	Section 5.4

3.4 Response to Submissions Mitigation Measures

Mitigation measures from the RtS that are relevant to the management of noise and vibration are outlined in Table 3-3 below.

Table 3-3 – Response to Submissions Mitigation Measures

Ref ID	Details	Where addressed
D4.2	<ul style="list-style-type: none"> - Where vibration levels are predicted to exceed the screening criteria, a more detailed assessment of the structure and vibration monitoring would be carried out in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework, to ensure vibration levels remain below appropriate limits for that structure. 	Section 5.4
C4.1	<ul style="list-style-type: none"> - The Inland Rail NSW Construction Noise and Vibration Management Framework (provided in Appendix E) would be implemented, and the proposal would be constructed with the aim of achieving the construction noise management levels and vibration criteria identified by the noise and vibration assessment. - All feasible and reasonable noise and vibration mitigation measures would be implemented - Any activities that could exceed the construction noise management levels and vibration criteria would be identified and managed in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework and the CEMP. - Notification of impacts would be undertaken in accordance with the communication management plan. 	Section 1.1 Section 5.1 Section 5.2

3.5 Construction Environmental Management Framework

The Construction Environmental Management Framework (CEMF) sets out the environmental management requirements for construction. The CEMF provides a link between the planning approval phase, detailed design and the construction environmental management documentation. Relevant construction environmental framework items requiring the preparation of a NVMP are outlined in Table 3-4.

Table 3-4 – Construction Environmental Management Framework

Ref ID	Details	Where addressed
12.3 a)	The construction contractor must develop and implement a Construction Noise and Vibration Management Plan consistent with the Inland Rail NSW Construction Noise & Vibration Management Framework (0-9000-ENV-00-RP- 0001) which must, include as a minimum: The construction noise and vibration mitigation measures as detailed in the Project approval documentation and Project conditions of approval;	This plan Section 5.1
12.3 b)	The requirement of the EPL;	Section 3.3
12.3 c)	The responsibilities of key project personnel as relevant with respect to the implementation of the plan;	Section 5.5
12.3 d)	Details of construction activities and an indicative schedule for construction works, including the identification of key noise and/or vibration generating construction activities (based on representative construction scenarios) that have the potential to generate noise or vibration impacts on surrounding sensitive receivers, in particular residential areas;	Section 1 - CEMP
12.3 e)	Pre-construction compliance requirements and hold points;	Quality Management Plan and Inspection Test Plan
12.3 f)	Records of any noise or vibration monitoring completed as triggered by these plans (including field observations, calibration records, field measurements and laboratory results);	Section 5.4
12.3 g)	Any environmental incidents, hazards or near-misses documented in relation to noise or vibration management;	Section 5.6
12.3 h)	Identification and documentation of any competencies, training, experience or qualification of personnel undertaking works under this plan; and,	Section 5.10
12.3 i)	Compliance record generation and management.	Section 5.12 Section 5.6 Section 5.7

3.6 Stakeholder Consultation and Approval

In accordance with the CoA, this NVMP has been developed in consultation with the EPA and relevant Councils.

This NVMP as a Sub-plan to the CEMP is required to be approved by the DP&E no later than one month before the commencement of construction activities. This NVMP will be endorsed by the Environmental Representative (ER) prior to the commencement of construction as required by the CoA. Construction will not commence until this NVMP has been approved by DP&E. This NVMP as approved by the DP&E, including any minor amendments approved by the ER, will be implemented for the duration of construction.

This consultation is intended to assist in development and finalisation of this NVMP. Table 3-5 summarises relevant stakeholder reviews and response to review.

Table 3-5 – Summary of Consultation

Agency	Requirement	Status	Response	Date
EPA	Consultation	Completed	<ul style="list-style-type: none"> Email with Comments No comments required to be included in NVMP 	26 October 2018
Parkes Shire Council	Consultation	Completed	<ul style="list-style-type: none"> Comments Sheet Comments included in Revision of NVMP 	26 September 2018
Narromine Shire Council	Consultation	Completed	<ul style="list-style-type: none"> Comments Sheet Comments included in Revision of NVMP 	8 October 2018
DP&E	Approval	Completed	<ul style="list-style-type: none"> Comments Sheet 	February 2019
ER	Endorsement	Completed	<ul style="list-style-type: none"> Endorsed 	2 November 2018

4. Key Risks

4.1 Existing Environment

Most of the Project site passes through rural land. Sensitive receivers are concentrated in the main towns (Parkes, Peak Hill, and Narromine), with scattered residential receivers located on rural properties surrounding the Project corridor.

Non-residential noise receivers include two places of worship, three educational facilities, one medical facility, six active and two passive recreation areas. Several commercial and industrial facilities are also located near the Project corridor.

Both attended and unattended noise monitoring was undertaken at various locations during the EIS. The objective of the monitoring was to measure the existing background noise levels in the area surrounding the Project corridor and to measure existing rail noise impact on sensitive receivers.

Baseline noise monitoring took place at nine residential locations and eight uninhabited locations between 2 September 2015 and 6 April 2016 in accordance with procedures outlined in the NSW Industrial Noise Policy (INP) Guideline. The data logger locations used for the assessment were representative of the existing background and ambient noise environment in the study area. The locations from the monitoring undertaken during the EIS have been summarised in Table 4-1.

Table 4-1 – Noise Monitoring Locations

Logger ID	Approximate chainage	Location description
L01P2N	555.4 km	80 Backwater Rd, Narromine
L02P2N	554.5 km	53 Wright St, Narromine
L03P2N	546.6 km	-
L04P2N	553.1 km	380 Tullamore Rd, Narromine
L05P2N	528.5 km	-
L06P2N	515.6 km	-
L07P2N	498.3 km	37 Station Lane, Peak Hill
L08P2N	497.4 km	1 Jackson St, Peak Hill
L09P2N	490.8 km	60 Trewilga Rd, Peak Hill
L010P2N	486 km	Off Mickibri Rd
L011P2N	478.15 km	-
L012P2N	468.5 km	-
L013P2N	457.7 km	503 Nanardine Ln, Parkes
L014P2N	452.5 km	Candobolin Rd, Parkes

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Logger ID	Approximate chainage	Location description
L015P2N	454.7 km	-
L016P2N	449 km	Goobang Junction, Parkes
L017P2N	457 km	-

Table 4-2 below is a summary of the calculated rating background level (RBL) noise monitoring results as per EIS.

Table 4-2 – Noise Monitoring Results

Location	LA90 (period) RBL noise levels			LAeq ambient noise levels		
	Day	Evening	Night	Day	Evening	Night
L01P2N	27	29	25	53	49	49
L02P2N	29	27	27	48	44	43
L03P2N	26	30	20	53	49	51
L04P2N	29	30	32	51	52	45
L05P2N	20	20	19	53	47	48
L06P2N	22	19	18	56	44	53
L07P2N	26	26	21	58	45	42
L08P2N	27	24	20	49	44	42
L09P2N	28	23	20	47	48	46
L010P2N	22	22	21	56	56	54
L011P2N	24	21	18	52	51	52
L012P2N	25	27	20	57	50	51
L013P2N	25	19	18	53	49	50
L014P2N	27	18	18	48	49	46
L015P2N	23	20	20	59	54	50
L016P2N	30	31	28	53	54	55
L017P2N	25	20	20	59	56	55

Unattended vibration monitoring was undertaken during the EIS with a vibration logger set up approximately 15 m from the existing rail line. Comparison with identified vibration causing activities

(existing train impact) indicated that elevated vibration levels occurred with the vibration levels being 1.0 to 1.3 mm/s at the monitoring locations.

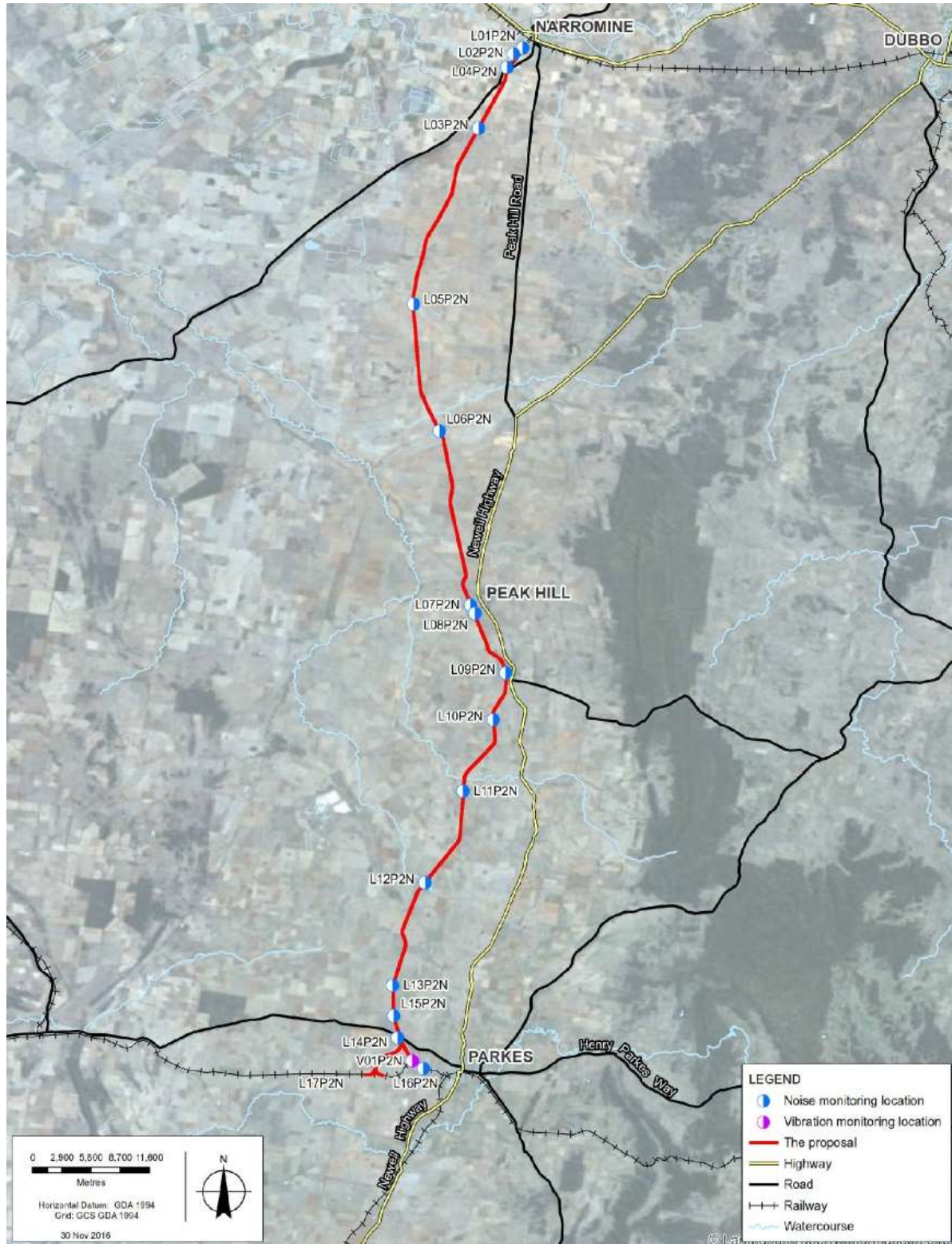


Figure 1 – Noise and vibration monitoring locations (source: EIS, GHD 2017)

4.2 Environmental Risk Assessment

Construction will require the use of plant and equipment which can generate elevated noise and vibration levels at nearby sensitive receivers. Potential impacts may vary greatly depending on the intensity and location of construction activities, the type of equipment used, existing background noise, intervening terrain, and prevailing weather conditions.

Potential noise impacts were predicted in the EIS, with a focus on those activities with the highest potential to cause noise impacts, and with the loudest two items of plant for each activity operated continuously. The construction activities and predicted sound levels for each task are listed in Table 4-3.

Table 4-3 – Construction Activities and Predicted Sound Levels

Tasks	Equipment	Sound Power Level for Task (L _w dBA)	Location
Site establishment works	Hand tools, road truck, excavator, water cart, grader, dump truck	118	Full alignment
Track upgrading – skim reconditioning	Dump truck, rail saw, vibratory roller, front end loader, grader, tamper and regulator	118	Full alignment
Track upgrading – track reconstruction	Dump truck, rail saw, vibratory roller, front end loader, grader, tamper and regulator	118	Full alignment
Drainage construction	Excavator, dump truck, franna crane, vibratory roller	118	Full alignment
Level crossings – upgrade to signalised level crossing	Asphalt paver, franna crane, excavator, vibratory roller, hand tools	115	Signalised level crossings
Level crossing – upgrade passive protection (give way signs to stop signs)	Hand tools, road truck	109	Level crossings
Level crossing – closure/ removal	Hand tools, excavator, front end loader, vibratory roller, road truck, tamper and regulator, franna crane	116	Level crossings for removal
Culvert removal and replacement	Crane, excavator, dump truck, road truck, vibratory roller, tamper and regulator, concrete truck	118	Culverts
Crossing loop construction	Excavator, dump truck, vibratory roller, front end loader	118	Crossing loops
Post construction works (finishing works/ reinstatement)	Road truck, hand tools, crane, excavator	113	Full alignment

Tasks	Equipment	Sound Power Level for Task (L _w dBA)	Location
Parkes north west connection – site establishment	Truck (medium rigid), crane, chainsaw, chipper	116	Parkes north west connection
Parkes north west connection - earthworks	Jackhammer, dozer, compactor, vibratory roller	120	Parkes north west connection
Parkes north west connection – track works	Vibratory roller, compactor front end loader, excavator	116	Parkes north west connection
Brolgan Road rail overbridge construction	Pavement laying machine, compactor, vibratory roller, concrete truck	117	Brolgan Road over Parkes north west connection

4.3 Risk Assessment Undertaken in EIS

Construction will result in noise and vibration impacts within and around the footprint of the Project. A risk assessment was undertaken in the EIS that resulted in an assessed level of medium or above for the following:

- Noise impacts on residents and local receivers from construction activities
- Noise impacts on residents and sensitive receivers from construction traffic.

4.4 On-Going Risk Assessment

A risk management approach will be used to determine the severity and likelihood of an activity's impact on the environment and to prioritise its significance. This process considers potential regulatory and legal risks, as well as taking into consideration the concerns of community and other key stakeholders.

The objectives of the risk assessment is to:

- Identify activities that have the potential to adversely affect the local environment and / or human health
- Qualitatively evaluate and categorise each risk item
- Assess whether risk issues can be managed by environmental protection measures
- Quantitatively evaluate and categorise each risk item
- Assess whether risk issues can be managed by environmental protection measures.

Risk assessments for the Project are based on AS / NZS ISO 31000:2009, the Australian and New Zealand Standard for Risk Assessments. The purpose of risk evaluation is to separate risk to be tolerated from those to be treated, by determining the severity of each risk and developing a prioritised list of risks that require treatment. The severity of each risk is determined from the Project Risk Level Matrix.

A risk register has been developed (J013_HSEQ_MGP_EMPS_CEMP) and includes a list of activities associated with the Project, related aspects and corresponding risks. Measures to minimise the

identified environmental risks are also provided. On-going risk assessment will be implemented throughout the construction program in accordance with Section 3.2 of the CEMP which will ensure new and changed environmental issues are identified and appropriately addressed.

4.5 Impact Identification

4.5.1 Noise Impacts and Limits

A majority of the Project’s deliveries will be by rail however, some heavy vehicles will be using the Newell Highway, Gwydir Highway/ Alice Street and Kamilaroi Highway, as well as local roads and existing access roads along the rail corridor. Pre-fabricated concrete units, fill and equipment deliveries will most likely be via road from suppliers or town centres.

As a result of the modelling during the EIS process, applicable sound levels were determined and are listed in Table 4-3. The applicable sound levels range from 109 dB(A) for level crossing works, to 120 dB(A) for earthworks. Most of the construction activities will generate an estimated sound power level of around 115 to 118 dB(A).

The noise assessment and findings of the EIS have been adopted for this NVMP, as it is considered that the concept design and proposed construction methodology is still valid and will be in general accordance with the EIS.

Table 4-4 below sets out the OOHW noise limits as outlined in the EPL. Table 4-5 sets out the standard working hours noise criteria as outlined in the *Interim Construction Noise Guideline*.

Table 4-4 – Noise Limits

Period	Land Use	Noise Limit
6:00 pm to 7:00 am - Monday to Friday	Classrooms at schools and other educational institutions, Hospital wards and operating theatres, Place of worship.	Internal noise level 45 dB(A)
6:00 pm Friday to 8:00 am Saturday	Active recreation areas (characterised by sporting activities and activities which generate their own noise of focus for participants, making them less sensitive to external noise intrusion)	External noise level 65 dB(A)
1:00 pm Saturday to 7:00 am Monday		
Any time on public holidays	Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External noise level 60 dB(A)
	Community centres	Depends on the intended use of the centre. Refer to the recommended 'maximum' internal levels in AS2107 for specific uses.

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Period	Land Use	Noise Limit
06:00 pm to 10:00 am On any other day	All other receivers (defined as those receivers not listed above)	L _{Aeq} (15 min) noise levels not greater than 5 dB(A) above the rating background level at the façade of any residence in accordance with the Interim Construction Noise Guidelines (DECC 2009).
10:00 pm to 07:00 am On any other day	All other receivers (defined as those receivers not listed above)	L _{Aeq} (15 min) noise levels not greater than 5 dB(A) above the rating background level at the façade of any residence in accordance with the Interim Construction Noise Guidelines (DECC 2009) or if between the hours of 10:00pm and 07:00am no more than 52 dB (A) LA (MAX) or the prevailing RBL plus 15 dB (A) LA (MAX), whichever is the higher.

Table 4-5 – ICNG standard construction hours noise criteria

Period	Land Use	Noise Limit
7:00 am to 6:00 pm - Monday to Friday 8:00am to 1:00 pm – Saturday No work on Sundays or public holidays	Residences	L _{Aeq} (15 min) noise levels greater than RBL + 10 dB(A) represents the point above which there may be some community reaction to noise. L _{Aeq} (15 min) noise levels greater than 75 dB(A) represents the point above which there may be strong community reaction. In accordance with the Interim Construction Noise Guidelines (DECC 2009).
	Classrooms at schools and other educational institutions, Hospital wards and operating theatres, Place of worship.	Internal noise level 45 dB(A)
	Active recreation areas (characterised by sporting activities and activities which generate their own noise of focus for participants, making them less sensitive to external noise intrusion)	External noise level 65 dB(A)
	Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External noise level 60 dB(A)
	Community centres	Depends on the intended use of the centre. Refer to the recommended 'maximum' internal levels in AS2107 for specific uses.

4.5.2 Vibration Impacts and Limits

Structural Impacts

Vibration impacts have the potential to be generated from general construction activities, as well as from piling. With the appropriate distance applied (> 18 m for general construction activities from standard residential buildings and 35m or greater is nominated for heritage buildings / structures), the structural impacts are not anticipated to cause structural damage or a risk of damage to buildings.

Due to the higher intensity of vibration impacts from piling, a greater distance is applied. If sensitive receivers fall inside the distances (18m for standard residential dwellings and 35m for heritage buildings / structures), then dilapidation surveys of buildings and structures will be undertaken prior to the commencement of construction by a suitably qualified and experienced person(s) (refer to Section 5.5.2 for further detail).

Additionally, in relation to piling methods may need to be investigated such as press-in hydraulic piling or jacked-in piling to reduce the potential for impact if the piling activity is in close proximity to the sensitive receiver. These methods generally exhibit much lower vibration levels compared to impact, vibratory and bored piling. The structural damage vibration impact distances and guideline values for short term vibration on structures and are shown in Table 4-6 and Table 4-7.

The vibration assessment and findings of the EIS have been adopted for this NVMP, as it is considered that the concept design and proposed construction methodology is still valid and will be in general accordance with the EIS.

Table 4-6 Structural Damage Vibration Impact Distances

Activity	Structure	Distance from sensitive receiver (m)
General construction activities	Standard residential building	18
	Heritage building	35
Impact piling	Standard residential building	100
	Heritage building	180
Vibratory piling	Standard residential building	30
	Heritage building	50
Bored piling	Standard residential building	17
	Heritage building	35

Table 4-7 – Guideline Values for Short Term Vibration on Structures (DIN 4150-3)

Type of Structure	Guideline Values for Velocity $v_i(t)^*$ [mm/s]		
	1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz
Buildings used for commercial purposes, industrial buildings, and buildings of similar design.	20	20 – 40	40 – 50
Dwellings and buildings of similar design and / or occupancy.	5	5 – 15	15 – 20
Structures that, because of their particular sensitivity to vibration, cannot be classified under above types and are of great intrinsic value (such as heritage listed buildings under preservation order).	3	3 – 8	8 – 10

*The term v_i refers to vibration level in any of the x, y, or z axes ** At frequencies above 100 Hz the values given in this column may be used as minimum values

Human Comfort Impacts

Table 4-8 and Table 4-9 outlines the human comfort criteria based on the vibration dose value and weighted acceleration. For construction related vibration, it is considered more appropriate to provide guidance in terms of a peak value, since this parameter is likely to be more routinely measured based on the more usual concern over potential building damage.

Humans can detect vibration at levels below those causing risk of damage to buildings. Based on a conservative assessment, it is possible that construction vibration for general construction activities may be felt up to 140 m from the works. There are 20 sensitive receivers that are located within 140 m from the works that have the potential to be impacted by vibration. Mitigation measures are outlined in Section 5.1 to manage the vibration impacts.

Table 4-8 – Human Comfort Intermittent Vibration Limits (BS 6472-1992)

Receiver Type	Period *	Intermittent Vibration Dose Value ($m/s^{1.75}$)	
		Preferred Value	Maximum Value
Critical Areas (e.g. hospitals)	Day	0.1	0.2
	Night	0.1	0.2
Residential	Day	0.2	0.4
	Night	0.13	0.26
Offices, Schools, Educational Institutes, and Places of Worship	Day and Night	0.4	0.8

*Note: Day is between 07:00am and 10:00pm and night is between 10:00pm and 07:00am

Table 4-9 – Guidance on Effects of Vibration Levels for Human Comfort (BS5228.2-2009)

Vibration Level mm/s	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction.
0.3	Vibration might be just perceptible in residential environments.
1.0	It is likely that vibration at this level in residential environments will cause complaints, but can be tolerated if warning and explanation has been given to residents.
10	Vibration is likely to be intolerable for any more than a very brief exposure.

Table 4-10 sets out the preferred and maximum weighted rms values for continuous and impulsive vibration acceleration as outlined in the *Assessing Vibration: A technical guideline*.

Table 4-10 – Preferred and maximum weighted rms values for continuous and impulsive vibration acceleration (m/s²) 1-80 Hz

Location	Assessment period ¹	Preferred values		Maximum values	
		z-axis	x and y-axis	z-axis	x and y-axis
Continuous vibration					
Critical areas ²	Day – or night-time	0.005	0.0036	0.01	0.0072
Residences	Daytime	0.01	0.0071	0.02	0.014
	Night-time	0.007	0.005	0.014	0.01
Offices, schools, educational institutions and places of worship	Day – or night-time	0.02	0.014	0.04	0.028
Workshops	Day – or night-time	0.04	0.029	0.08	0.058
Impulsive vibration					
Critical areas ²	Day – or night-time	0.005	0.0036	0.01	0.0072
Residences	Daytime	0.3	0.21	0.6	0.42
	Night-time	0.1	0.071	0.2	0.14
Offices, schools, educational institutions	Day – or night-time	0.64	0.46	1.28	0.92

Location	Assessment period ¹	Preferred values		Maximum values	
		z-axis	x and y-axis	z-axis	x and y-axis
and places of worship					
Workshops	Day – or night-time	0.64	0.46	1.28	0.92

¹Daytime is 7:00 am to 10:00 pm and nighttime is 10:00 pm to 7:00 am

²Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. There may be cases where sensitive equipment or delicate tasks require more stringent criteria than the human comfort criteria specified above. Stipulation of such criteria is outside the scope of this policy, and other guidance documents (e.g. relevant standards) should be referred to. Source BS 6472-1992

Table 4-11 sets out the acceptable vibration dose values for intermittent vibrations as outlined in *Assessing Vibration: A technical guideline*.

Table 4-11 – Acceptable vibration dose values for intermittent vibrations (m/s^{1.75})

Location	Daytime ¹		Night-time ¹	
	Preferred value	Maximum value	Preferred value	Maximum value
Critical areas ²	0.1	0.2	0.1	0.2
Residences	0.2	0.4	0.13	0.26
Office, schools, educational institutions and places of worship	0.4	0.8	0.4	0.8
Workshops	0.8	1.6	0.8	1.6

5. Management

5.1 Mitigation and Management Measures

A range of environmental requirements and mitigation measures are identified in various environmental documents including the EIS and the CoA.

5.1.1 Construction Hours

Works affecting any one receiver will be undertaken during the hours of 6:00 am to 6:00 pm each day over a three month period if there is no work between the hours of 1:00 pm on a Saturday and 7:00 am on a Monday every alternate week.

Activities resulting in impulsive or tonal noise emissions will only be undertaken according to the EPL which includes the following:

- Between the hours of 8:00 am to 6:00 pm Monday to Friday
- Between the hours of 8:00 am to 1:00 pm Saturday
- In continuous blocks (i.e. period during which there is less than a 1 hour respite between ceasing and recommencing any works) not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block.

Negotiated agreements may be reached with sensitive receivers (owners and occupiers) to carry out works in accordance with the hours and noise limits specified in the negotiated agreements. All negotiated agreements will be recorded with the ARTC Community and Stakeholder Consultation System be in writing and finalised before the commencement of works.

5.1.2 Out of Hours

Notwithstanding the approved construction hours, works associated with the CSSI may be undertaken outside the hours specified under those conditions in the following circumstances:

- a) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or
- b) where it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm; or
- c) where different construction hours are permitted under an EPL in force in respect of the CSSI; or
- d) where a negotiated agreement is in force, in accordance with Condition E4 and E5; or
- e) construction that causes LAeq (15 minute) noise levels:
 - i) no more than 5 dB(A) above the rating background level at the façade of any residence in accordance with the Interim Construction Noise Guideline (DECC, 2009) or if between the hours of 10:00 pm and 7:00 am no more than 52 dB(A) or more than 15 dB(A)LA(Max) above the rating background level whichever is the higher, and
 - ii) no more than the noise management levels specified in Table 3 of the Interim Construction Noise Guideline (DECC, 2009) at other sensitive land uses, and

iii) continuous or impulsive vibration values, measured at the most affected residence are no more than those for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC 2006), and

iv) intermittent vibration values measured at the most affected residence are no more than those for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC 2006).

5.1.3 Additional Measures

Additional mitigation and management measures to address any impacts that may be identified during the construction phase of the Project are outlined in Table 5-1.

Table 5-1 – Mitigation and Management Measures

Ref ID	Details	Responsibility	Source
NV1	All construction vehicles and machinery will be fitted with manufacturer supplied noise suppression devices if required and maintained as per manufacturer specifications.	Supervisors	EIS N&V Technical Report No. 1.1
NV2	All site workers will be informed of the potential for noise and vibration impacts upon sensitive receivers and will take practical and reasonable measures to minimise noise during activities.	Environmental Manager	EIS N&V Technical Report No. 1.2
NV3	A community liaison phone number and permanent site contact will be provided so that noise and / or vibration related complaints, if any, can be received and addressed in a timely manner.	Communications Manager	EIS N&V Technical Report No. 1.4
NV4	For any work that will take place outside the approved construction hours the Out of Hours Works (OOHW) process in Section 5.1.2 will be followed	Environmental Manager	Good practice
NV5	Work methods will be reviewed with a preference for quieter and non-vibration generating methods, wherever possible.	Environmental Manager	EIS N&V Technical Report technical report No. 1.6
NV6	Material stockpiles including loading and unloading areas will be located as far as possible from the nearest sensitive receivers. Loading and unloading of materials will occur preferably during standard construction hours	Supervisors	EIS N&V Technical Report No. 1.7 CEMF
NV7	Where possible, materials dropped from heights into or out of trucks will be minimised.	Supervisors	EIS N&V Technical Report No. 1.8 CEMF
NV8	Stationary noise sources (pumps, generators, compressors) will be located as far as possible from the nearest sensitive receivers. Stationary noise sources if practicable would be enclosed or shielded while ensuring that the health and safety of workers is maintained.	Supervisors	EIS N&V Technical Report No. 1.9 CEMF

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Ref ID	Details	Responsibility	Source
NV9	Where possible, no plant or equipment will be left idling when operating near sensitive receivers.	Supervisors	EIS N&V Technical Report No. 1.10
NV10	All vehicular movements to and from the site will comply with the requirements of the appropriate regulatory authority requirements for such activities and the Transport, Traffic and Access Management Plan.	Environmental Manager	EIS N&V Technical Report No 1.11
NV11	Any noise and vibration monitoring will be undertaken by a suitably qualified person and with consideration to the relevant standards and guidelines.	Environmental Manager	EIS N&V Technical Report No. 1.13
NV12	If vibration-generating activities are conducted within proximities outlined in Table 4-2 (Safe Working Distances) alternative work methods will be implemented so the vibration impacts are reduced to acceptable levels.	Environmental Manager	EIS N&V Technical Report No 1.15 / 1.16
NV13	Specific consultation will be undertaken with potentially impacted sensitive receivers prior to commencement of vibration generating activities, and throughout the construction phase, with regards to potential detectable vibration levels. Where required, specific work practices or scheduling arrangements will be considered to minimise potential impacts on the sensitive receivers.	Environmental Manager	EIS N&V Technical Report No. 1.18
NV14	In cases where noise or vibration levels are identified as likely exceeding applicable criteria, refer to Section 5.4.3. Modification or substitution of work methods will be undertaken wherever possible, including but not limited to: <ul style="list-style-type: none"> • Works programming assessments • Selective use of enhanced equipment/plant • Noise barriers or earthen bunds • Equipment/plant substitution.. 	Environmental Manager	Good Practice
NV15	Use of horns, bells, beepers and other audible signals will be minimised as much as practicable.	Supervisors	Good Practice
NV16	Ancillary facilities to be located at least 1 km from sensitive receivers, where feasible and reasonable.	Environmental Manager	CEMF
NV17	Construction works will only be undertaken during approved working hours, unless otherwise permitted by the EPL.	Environmental Manager	CoA E1 CEMF EIS N&V Technical Report technical report No. 1.12
NV18	Activities resulting in impulsive or tonal noise emissions will only be undertaken within the specified hours as permitted by the EPL.	Environmental Manager	CoA E7

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Ref ID	Details	Responsibility	Source
NV19	Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage will be notified before construction that generates vibration commences near those properties.	Environmental Manager	CoA E9
NV20	Blasting will not be undertaken at any time.	Environmental Manager	CoA E10
NV21	Plant and equipment will not exceed the applicable noise levels and vibration criteria as outlined in Section 4.5.	Environmental Manager	CoA E8
NV22	Simultaneous operation of noisy plant within range of sensitive receivers will be avoided.	Supervisors	EIS Appendix K: CEMP Outline - Table K.1
NV23	The offset distance between noisy plant and adjacent sensitive receivers will be maximised.	Supervisors	EIS Appendix K: CEMP Outline - Table K.1
NV24	Site topography will be considered when situating plant and use structures (such as site shed placement, earth bunds, fencing, noise barriers) and shielding will be used where appropriate.	Supervisors	EIS Appendix K: CEMP Outline - Table K.1
NV25	Noise-emitting plant will be directed away from sensitive receivers.	Supervisors	EIS Appendix K: CEMP Outline - Table K.1
NV26	Plant used intermittently will be throttled down or shut down.	Supervisors	EIS Appendix K: CEMP Outline - Table K.1
NV27	For construction sites located near sensitive receivers, reversing movements within the site will be minimised to reduce noise emissions from reversing beepers.	Environmental Manager	EIS Appendix K: CEMP Outline - Table K.1
NV28	Any additional access roads and access points will be selected to minimise impacts on sensitive receivers.	Environmental Manager	EIS Appendix K: CEMP Outline - Table K.1
NV29	Where practicable, delivery vehicles will be fitted with straps rather than chains for unloading.	Supervisors	EIS Appendix K: CEMP Outline - Table K.1
NV30	Vibration monitoring and testing is to be undertaken throughout the Project.	Environmental Manager	Good Practice

5.2 Community Consultation and Engagement

In accordance with CoA B1, a Communication Strategy will be implemented to inform residents of proposed construction activities. The Communication Strategy will be initiated prior to the commencement of construction to ensure that the community are aware of proposed construction activities and potential noise and vibration impacts. The Communication Strategy will establish communication protocols for community feedback on noise and vibration issues.

Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage will be notified before construction that generates vibration commences near those properties. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owner and occupiers are to be provided a schedule of potential exceedances for the duration of the potential exceedances, unless otherwise agreed by the owner and occupier.

Notification to the affected noise sensitive receivers of works approved outside of standard construction hours will occur not less than 5 days and not more than 14 days before those works are to be undertaken. The notification will include:

- By letterbox drop or email
- Be detailed on the project website.

The notification required will include the following:

- Clearly outline the reason that the work is required to be undertaken outside the hours
- Include a diagram that clearly identified the location of the proposed works in relation to nearby cross streets and local landmarks
- Include details of relevant time restrictions that apply to the proposed works
- Clearly outline, in plain English, the location, nature, scope and duration of the proposed works
- Detail the expected noise impact of the sensitive receivers
- Clearly state how complaints may be made and additional information obtained
- Include the number of the telephone complaints line, an after hours contact phone number specific to the works undertaken outside the hours and the project website address.

5.3 Construction Noise and Vibration Impact Statements (CNVIS)

Construction Noise and Vibration Impact Statements (CNVIS) will be prepared and are applicable to all hours of work (standard and out-of hours). CNVIS will support EPL variation applications to the EPA for out-of-hours works proposals, as well as ensure construction activities are in accordance with the EPL Condition L3 Noise Limits and SSI 7475 CoA Part E Noise and Vibration.

The CNVIS will include the following:

- Details of the nature and scope of each activity and work, including details of times, vehicles, plant and equipment to be used to undertake that activity or work
- Detailed analysis to justify use of the selected construction and work methods, plant and equipment compared to alternatives taking into consideration noise, vibration and traffic noise impacts
- Details of the predicted noise levels for standard hours and out of hours activities (model)

- Table showing details of the noise and vibration mitigation measures for each activity and work, including respite periods, proposed to be adopted to minimise noise and vibration impacts on surrounding noise sensitive receivers in each locality
- Address of each of the most affected sensitive receivers
- Diagram showing the location of noise and vibration monitoring locations in relation to each of the most affected noise and vibration sensitive receivers for each activity
- Maps showing noise catchment areas and sensitive receivers
- Excel format of the sensitive receivers and the predicted noise levels.

CNVISes will be used to manage noise so to meet the EPL noise criteria as well as to provide mitigation and management measures to be implemented where the criteria cannot be met. in accordance the requirements of the EPL.

5.4 Construction Monitoring Program

A Construction Monitoring Program for noise and vibration has been developed and consultation has been undertaken with the EPA and relevant Councils (refer to Section 3.6). The results of monitoring undertaken as part of this Construction Monitoring Program will be submitted to DP&E, the ER, the EPA and relevant Councils. The results will be reported against the relevant criteria. This submission will be in the form of a Construction Monitoring Report and will be provided at the frequency required by the Construction Monitoring Program.

The Construction Monitoring Program will be endorsed by the ER and submitted to DP&E for approval at least one month before commencement of construction. The Construction Monitoring Program will be implemented for the duration of the Project. A suitably qualified person will undertake the actions in the Construction Monitoring Program.

5.4.1 Noise Monitoring

Unattended noise monitoring will be attended to verify the accuracy of the EIS. Unattended noise testing will be conducted in the same locations that was conducted for the EIS including nine residential locations and eight locations within the rail corridor. The locations used for the assessment are considered to be representative of the existing background and ambient noise environment. Noise monitoring locations may be modified to locations, if access is identified to be restricted.

Attended noise monitoring will be attended to verify the accuracy of the EIS. Noise monitoring will be undertaken throughout the construction phase of the Project in accordance with the following requirements:

- As required by the EPL or CoA
- When noise impacts are predicted to be above a certain level (>75dB(A))
- Upon commencement of a new activity (to verify the accuracy of prediction)
- Performed at least on a monthly basis at the specified locations
- As required within a CNVIS (associated with Out of Hours Works)

Where appropriate in response to a noise related complaint(s). All noise monitoring equipment used will be at least Type 2 instruments as described in AS IEC 61672.1 2004 'Electroacoustic – Sound Level Meters – Specifications' and calibrated to standards that are traceable to Australian Physical Standards held by the National Measurement Laboratory (CSIRO Division of Applied Physics). The calibration of the monitoring equipment will be checked in the field before and after the noise measurement period in accordance with Standards Australia AS/IEC 60942:2004/IEC 60942:2003– Electroacoustic – Sound Calibrators.. The noise testing procedures will be followed by personnel suitably qualified and experienced in undertaking acoustic measurements.

All environmental noise measurements will be taken with the following meter settings:

- Time Constant - FAST (i.e. 125 milliseconds)
- Frequency Weightings - A-weighting
- Sample Period - 15 minutes.

The noise loggers will be programmed to accumulate L_{A90} , L_{A10} , L_{Aeq} and L_{Amax} data and will be assessed against applicable noise levels. Measurements of noise will be disregarded when it is raining and / or the wind speed is greater than 5m/s (18km/HR).

Outdoor noise monitoring is to be undertaken at least 3.5 m from any reflecting structure other than the ground. The preferred measurement height is 1.2 to 1.5m above the ground. Where the noise monitors are placed within 3.5 m of building facades, walls or cliffs, then a reflection correction of up to -2.5dB(A) shall be applied to remove the effect of increased noise due to sound reflections from such structures. Measurements inside buildings will be at least 1 m from the walls or other major reflecting surfaces, 1.2 to 1.5 m above the floor, and about 1.5 m from windows.

The following information will be recorded within the noise monitoring record template:

- Date and time of measurements
- Type and model number of instrumentation
- Results of field calibration checks before and after measurements
- Description of the time aspects of each measurement (i.e. sample times, measurement time intervals and time of day)
- Monitoring will be undertaken at the nearest sensitive receiver
- Sketch map of area
- Measurement location details and number of measurements at each location
- Weather conditions during measurements
- Operation and load conditions of the noise sources under investigation
- Any adjustment made for presence or absence of nearby reflecting surfaces
- Noise due to other sources (e.g. traffic, aircraft, trains, dogs barking, insects etc.).

5.4.2 Vibration Monitoring

Vibration monitoring is to be undertaken throughout the Project in accordance with the following requirements:

- Attended vibration measurements will be undertaken at the commencement of vibration generating activities located in close proximity to sensitive receivers to confirm that vibration levels are within the acceptable range to prevent cosmetic building damage.
- Trial vibration testing will be undertaken as required, prior to undertaking any high vibration activities. Trials would be undertaken in non-sensitive areas and at a range of distances from the source. The results of the trial monitoring would be compared against predicted vibration levels and the potential for impact refined, if deemed appropriate.
- Testing for both structural damage and human comfort where either the 'safe working distances' cannot be complied with or vibration levels are predicted to be greater than the maximum values for human comfort as a result of works
- As required by a CNVIS
- As required by the CoA and EPL.
- In response to complaints in accordance with the requirements of the CoA and EPL.

Vibration monitoring will be undertaken in accordance with the vibration measurement requirements stipulated in the legislative standards and guidelines, and will include the following:

- Vibration monitoring equipment will be placed outside at the footings or foundations of the building of interest, closest to the vibrating plant
- Surface will be solid and rigid in order to best represent the vibration entering the structure of the building under investigation
- Vibration sensor or transducer shall not be mounted on loose tiles, loose gravel or other resilient surfaces
- Vibration sensor or transducer shall be directly mounted to the vibrating surface using either bees wax or a magnetic mounting plate onto a steel washer, plate or bracket which shall be either fastened or glued to the surface of interest
- Where a suitable mounting surface is unavailable, then a metal stake of at least 300mm in length shall be driven into solid ground adjacent to the building of interest, and the vibration sensor or transducer shall be mounted on that.

Vibration monitoring will be undertaken at monitoring locations consistent with the baseline monitoring locations as shown in the EIS, including nine residential locations and eight locations within the rail corridor. Vibration monitoring will occur once a month at each of the specified locations.

The following procedure is to be followed by personnel suitably qualified and experienced in undertaking vibration measurements. Data that is collected will be compared against applicable criteria and baseline data. All vibration monitoring equipment is to be calibrated at least once every two years to standards that are traceable to Australian Physical Standards held by the National Measurement Laboratory (CSIRO Division of Applied Physics). The monitoring system will also have a measurement frequency range down to 1 Hz.

All short-term vibration monitoring will be recorded over 15 minute sample intervals. The magnitude of vibration is to be recorded at a minimum rate of 10 samples per second. The following minimum range of vibration metrics will be stored in memory and reported:

- Vibration Dose Values (VDVs)
- Root-mean-square (rms) – maximums and statistical levels
- Peak-particle velocity (ppv) – maximums and statistical levels.

In addition to measuring and reporting overall vibration, statistical vibration will also be measured and reported in third-octave band frequencies from 1Hz to 250Hz.

The following information will be recorded within the vibration monitoring record template:

- Date and time of measurements
- Type and model number of instrumentation
- Description of the time aspects of each measurement (i.e. sample times, measurement time intervals and time of day)
- Sketch map of area
- Measurement location details and number of measurements at each location
- Operation and load conditions of the vibrating plant under investigation
- Possible vibration influences from other sources (e.g. domestic vibrations, other mechanical plant, traffic, etc.).

5.4.2.1 Dilapidation Surveys

Prior to commencing activities, dilapidation surveys will be undertaken on the current condition of surface and sub-surface structures owned by third parties and identified as being at risk of structural damage from vibration causing activities during the construction phase of the Project. The dilapidation surveys are to be prepared by a suitably qualified and experienced person(s). The results of the dilapidation surveys will be provided to the relevant owners of surface and sub-surface structures for review prior to the commencement of potentially impacting works at each location.

Post-dilapidation surveys may be required to be undertaken if damage has been identified to the surface and sub-surface structures as a result of the construction phase of the Project (up to three months post construction or as agreed by DP&E). The results of the subsequent dilapidation surveys will be provided to the relevant owners of the structures and sub-surface structures within one month of undertaking the surveys.

Assessments will be undertaken by the Environmental Manager and suitably qualified and experienced person(s) to determine whether rectifications are to be carried out within three months of completion of the post-dilapidation surveys unless otherwise agreed with the owner of the affected surface and sub-surface structure.

5.4.3 Exceedance of Noise and Vibration Levels

In the event of an exceedance of noise levels and vibration criteria, works will cease or be modified at the direction of the Environmental Manager or delegate. Modification or substitution of work

methods will be undertaken wherever possible, including but not limited to, with additional measures to undertake monitoring as required:

- Equipment / plant substitution.
- Selective use of enhanced equipment / plant
- Noise barriers or earthen bunds.

5.5 Roles and Responsibilities

All site personnel will ensure that environmental nuisance or harm is minimised by adherence to all CEMP, Sub-plans and other documentation. Site personnel are also responsible for ensuring they do not act in contravention of any conditions of the CoA or EPL.

Supervisors are responsible for implementation and maintenance of noise and vibration mitigation measures for all activities and work areas.

The Environmental Manager is responsible for routine surveillance and monitoring, communication of requirements of this Sub-plan, coordination of visual monitoring, and all other responsibilities related to noise, and vibration identified within this sub-plan and overall CEMP. The Environmental Manager is also responsible for the immediate notification of State and/or Commonwealth Regulatory Authorities as per conditions of the CoA and EPL. The Environmental Manager is responsible for the immediate notification to ARTC for all other impacts that have mandatory reporting requirements.

The Project Manager is responsible for overseeing implementation of this NVMP and the CEMP.

5.6 Environmental Incidents, Non-Compliance and Complaints

General environmental incidents, non-compliances and complaints will be undertaken in accordance with Section 6 of the CEMP.

In the event of a complaint, non-compliance or incident, an investigation will be undertaken to determine the cause of the problem lead by the Environmental Manager. Any identified impacts on noise and vibration, the identified source and corrective actions are to be documented and managed in accordance with this NVMP and in accordance with Section 6.1 of the CEMP and recorded in the Corrective and Improvement Action Database. Complaints will be handled in accordance with Section 6.3 of the CEMP.

In the event of any non-compliance (an occurrence, set of circumstances or development that is a breach of the approval conditions [CoA or EPL] but is not an incident), the non-compliance will be managed by the Environmental Manager and if required corrective action/s will be raised. All corrective actions and improvements will be entered into the Corrective or Improvement Actions Database and will be closed out as soon as practical (to be reviewed during the using the Weekly Environmental Checklist).

In response to complaints from noise and vibration, the source of noise or vibration will be investigated. Monitoring will be undertaken during such activities to confirm if levels are within applicable criteria. If levels are found to be above applicable criteria the activity will be ceased until mitigation measures can be implemented ensuring levels remain below applicable assessment criteria for the duration of the activity. The following mitigation will be undertaken:

- Environmental Team consultation with Construction Team and Community Team
- Determination of appropriate environmental controls
- Potential relocation of affected resident member and / or change to the construction methodology.

5.7 Inspections and Auditing

General inspections and auditing will be undertaken in accordance with Section 7 of the CEMP.

The Environmental Team will undertake environmental inspections, audits and reporting to develop and evaluate the effectiveness of environmental controls and will include the following:

- Daily visual inspections
- Weekly inspections using the Weekly Environmental Checklist
- Monthly reporting to the Client on this aspect will be recorded through Project Monthly Reports
- Annual independent audits
- ER regular monitoring of the implementation of the documents listed in the CoA.

5.10 Training and Awareness

General training and awareness will be undertaken in accordance with Section 8 and 9 of the CEMP.

All employees and contractors working on site will undergo site induction training related to noise and vibration. The general site induction will address elements including:

- Noise and vibration mitigation techniques and measures to be implemented during construction of the Project
- Working within approved hours
- Working with noisy equipment away from sensitive receivers
- Using noise screens and temporary barriers
- Operating and maintaining plant and equipment to minimise noise
- Use of compression braking not being permitted near the site
- Turning off machinery when not in use
- Limiting the "clustering" of noisy plant / processes
- Out-of-hours works and its approval process
- Sensitive receivers.

Training will also include toolbox talks and pre-start meetings in which the topics of the site induction will be revisited.

5.11 Emergency Planning and Response

Emergency planning and response will be undertaken in accordance with Section 10 of the CEMP.

Where any unauthorised impact on sensitive receivers within the Project is identified, construction activities resulting in impacts will be ceased immediately and appropriate mitigation measures identified and implemented.

All such impacts, the identified source and corrective actions are to be documented and managed in accordance with the NVMP, the CEMP and Sub-plans and recorded in the Corrective and Improvement Action Database.

On becoming aware of the need for emergency works in accordance with Condition E3(b) of the CoA, notifications will occur in writing to DP&E (compliance@planning.nsw.gov.au), the ER and the EPA of the need for that work. The use best endeavours to notify all affected sensitive receivers of the likely impact and duration of those works must be undertaken.

5.12 Document Review

General document review will be undertaken in accordance with Section 11 of the CEMP.

This NVMP will be reviewed utilising the Corrective and Improvement Action Database simultaneously to reviews of the overarching CEMP and any amendments cited and cross checked against each plan.

For the duration of the works until the completion of construction, the approved ER must:

- Review documents identified in the CEMP, Sub-plans, Construction Monitoring Programs and any other documents that are identified by the Secretary, to ensure they are consistent with requirements in or under this approval and if so:
 - Make a written statement to this effect before submission of such documents to the Secretary (if those documents are required to be approved by the Secretary) or
 - Make a written statement to this effect before the implementation of such documents (if those documents are required to be submitted to the Secretary / Department for information or are not required to be submitted to the Secretary / Department).



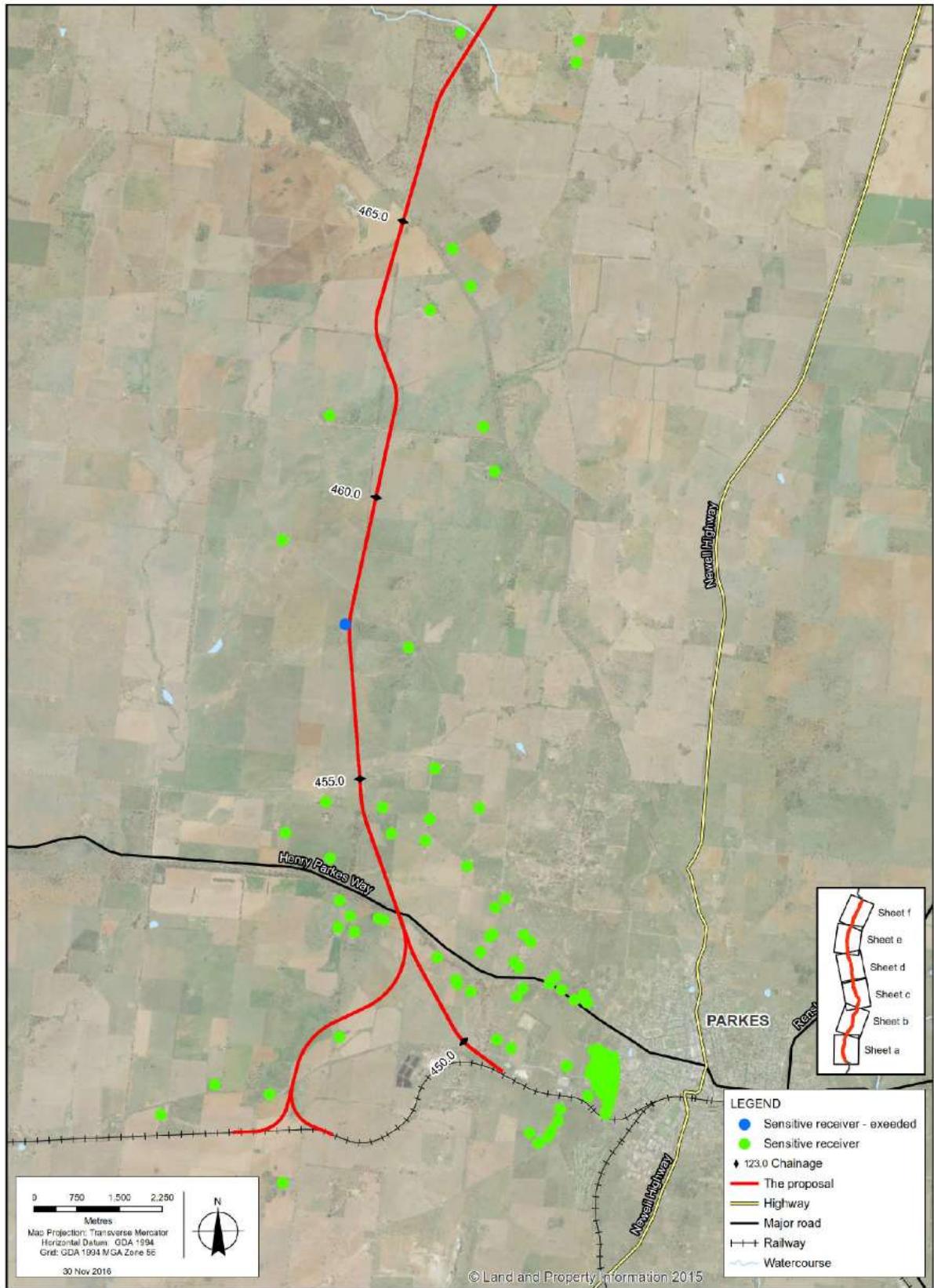
Attachment A
Sensitive Receiver Locations

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Noise and Vibration Management Plan

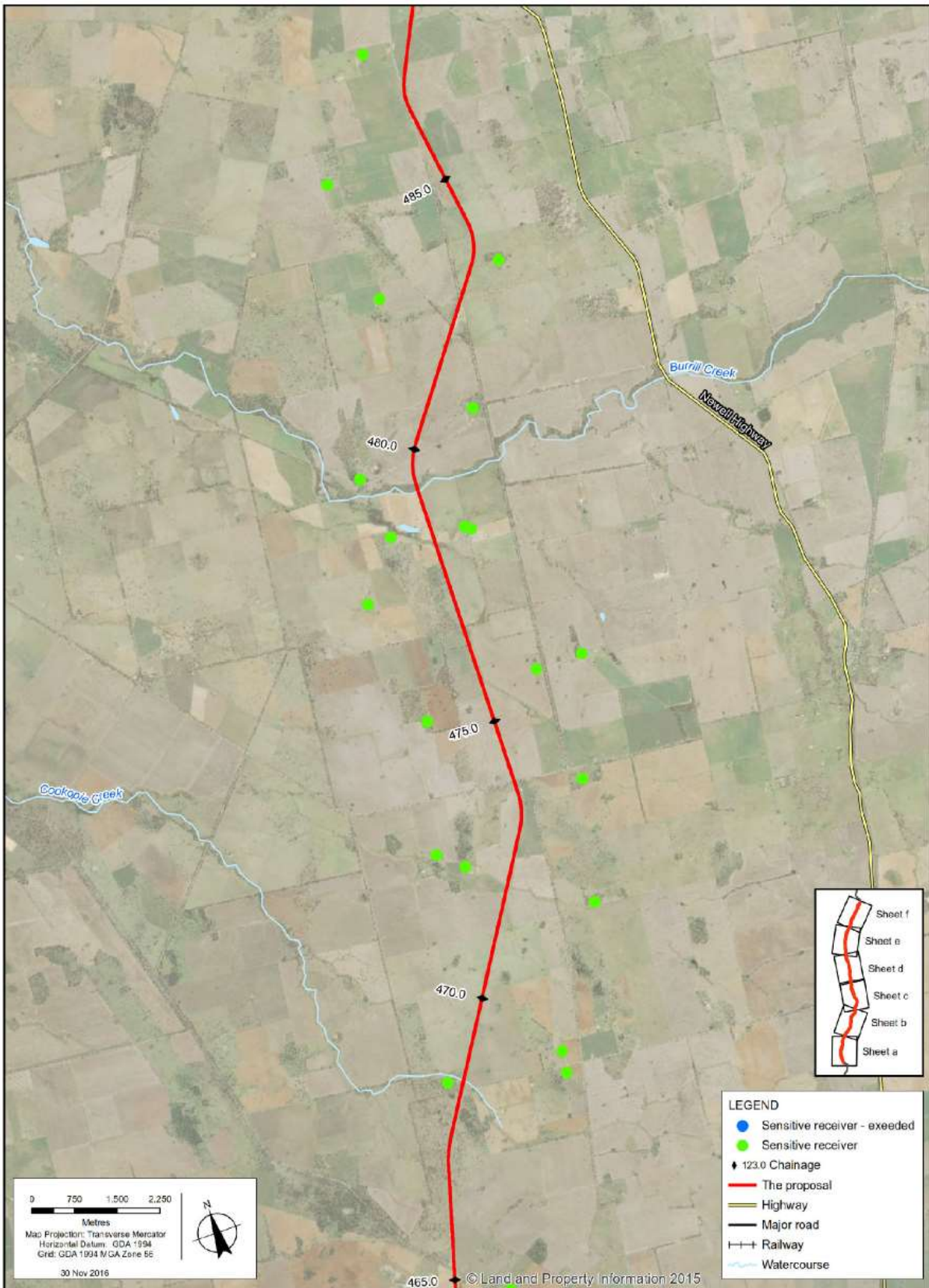
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Sensitive Receiver Locations – Map 1

Noise and Vibration Management Plan

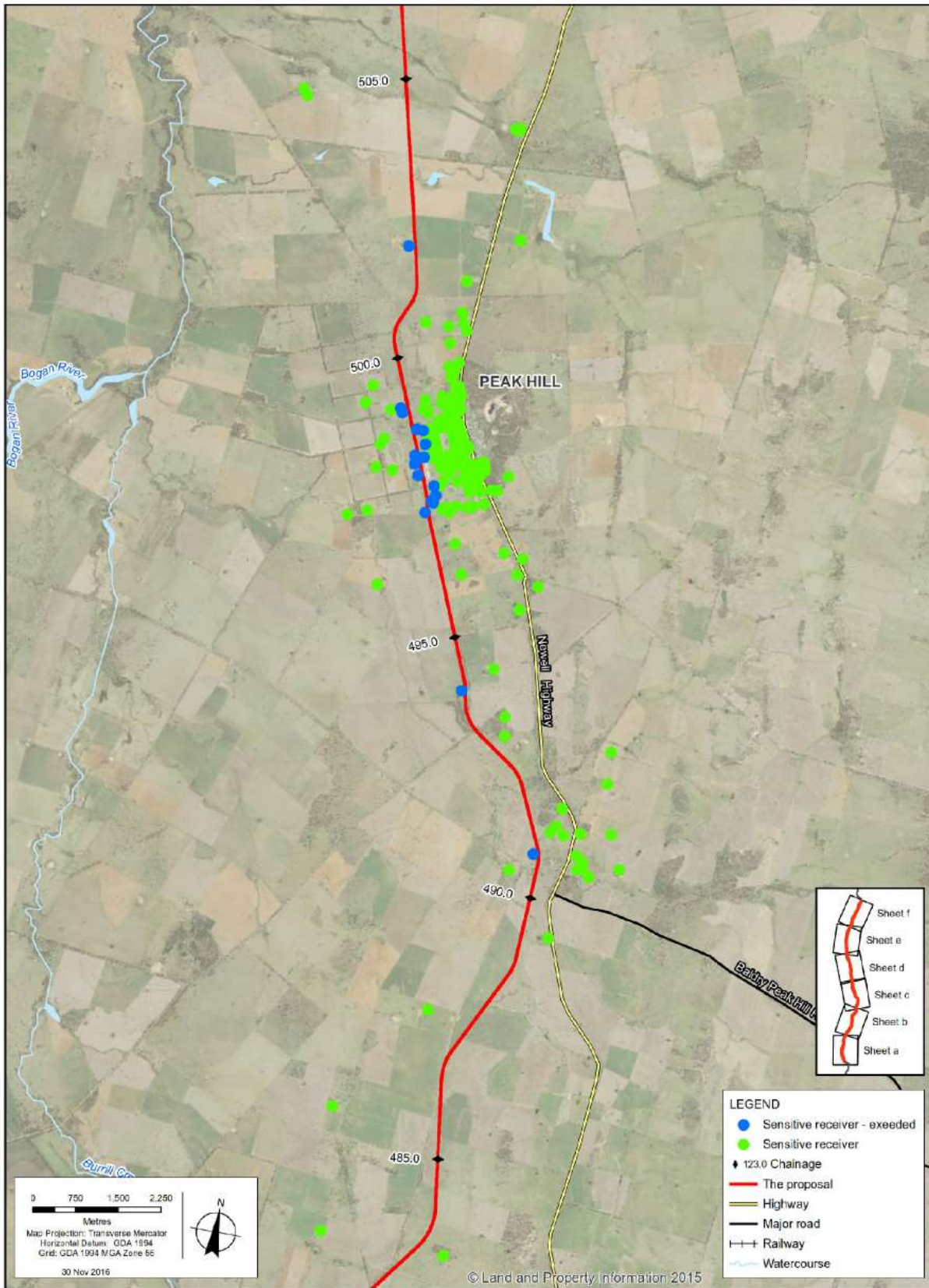
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Sensitive Receiver Locations – Map 2

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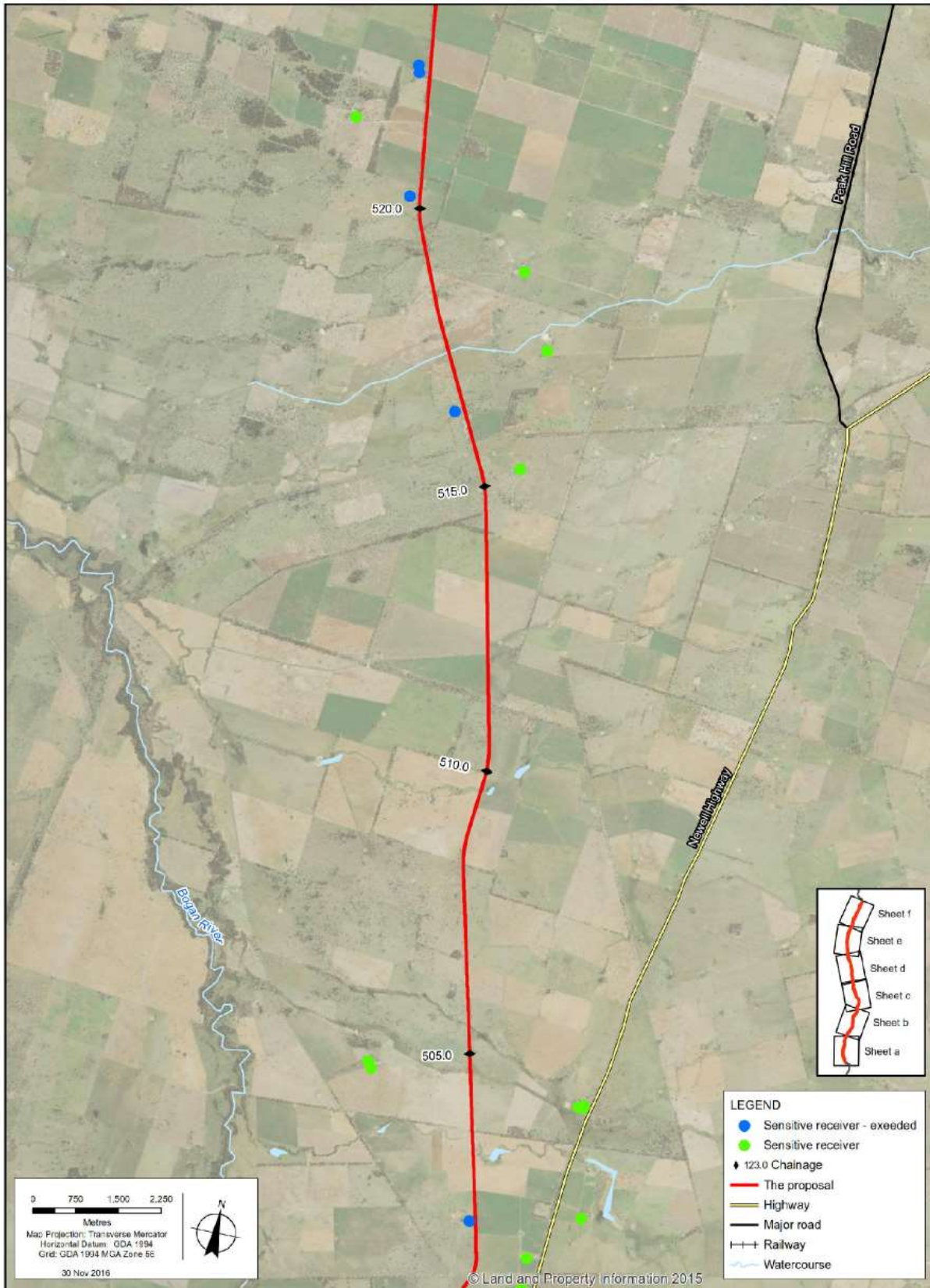
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Sensitive Receiver Locations – Map 3

Noise and Vibration Management Plan

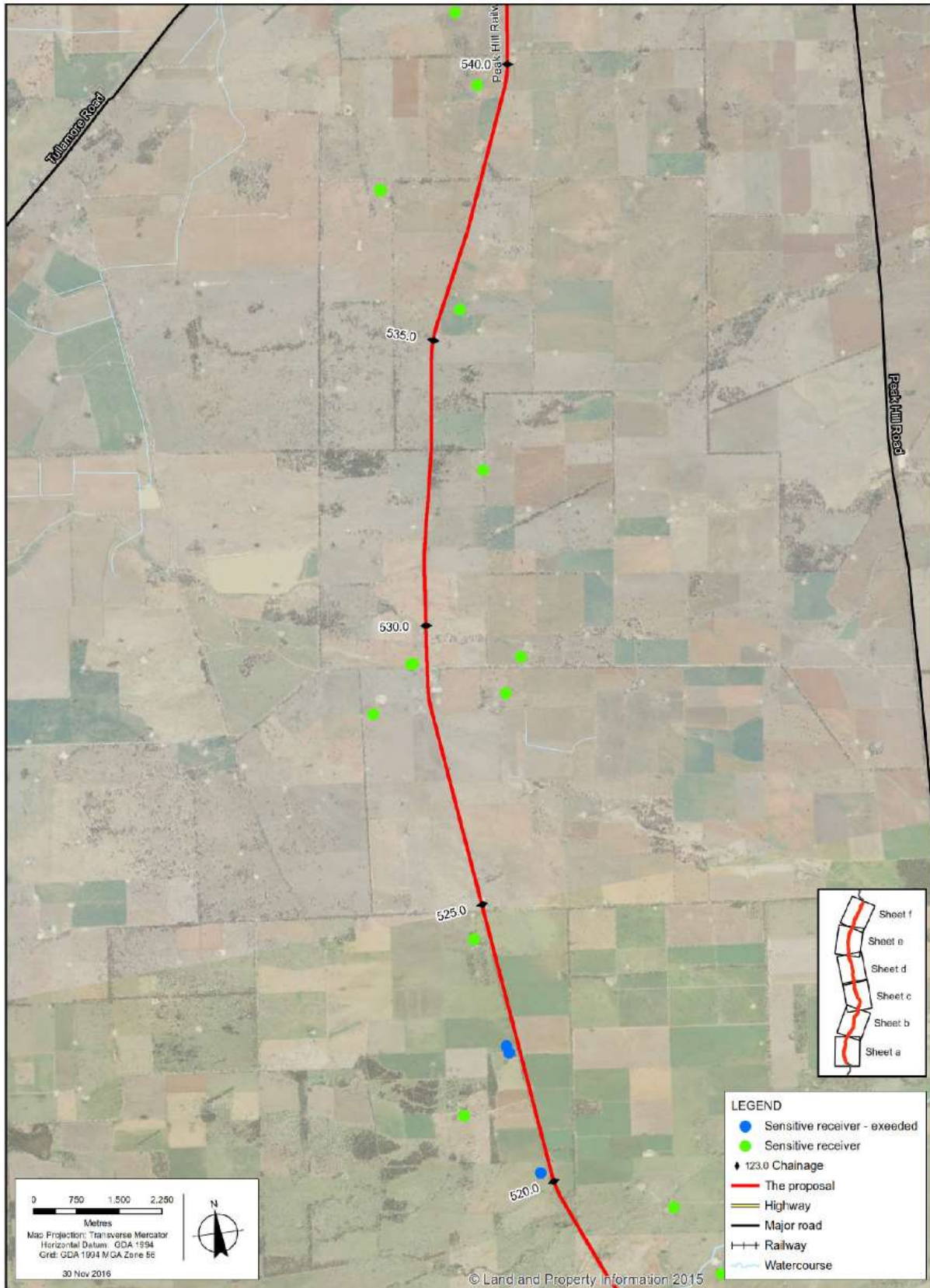
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Sensitive Receiver Locations – Map 4

Noise and Vibration Management Plan

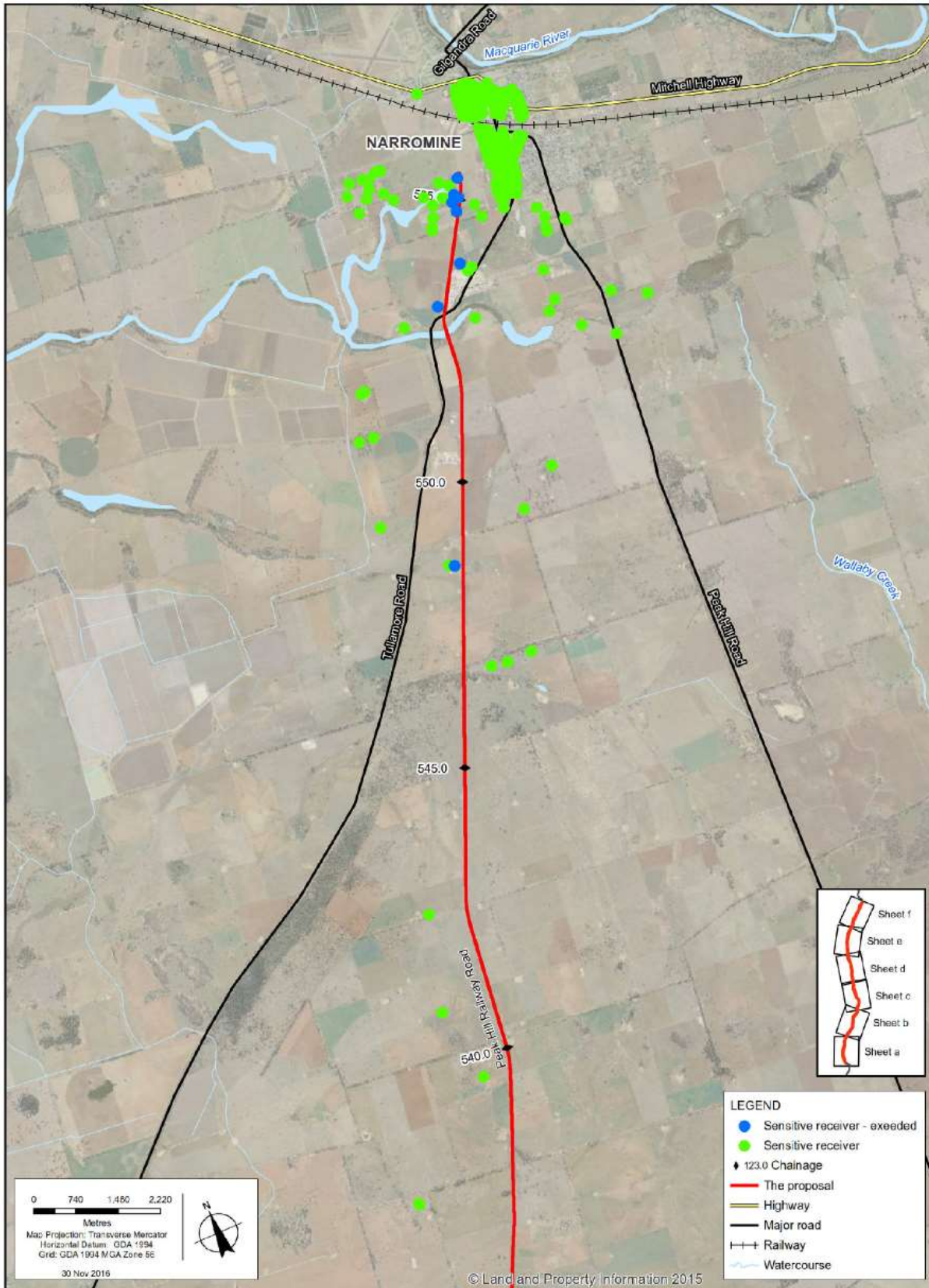
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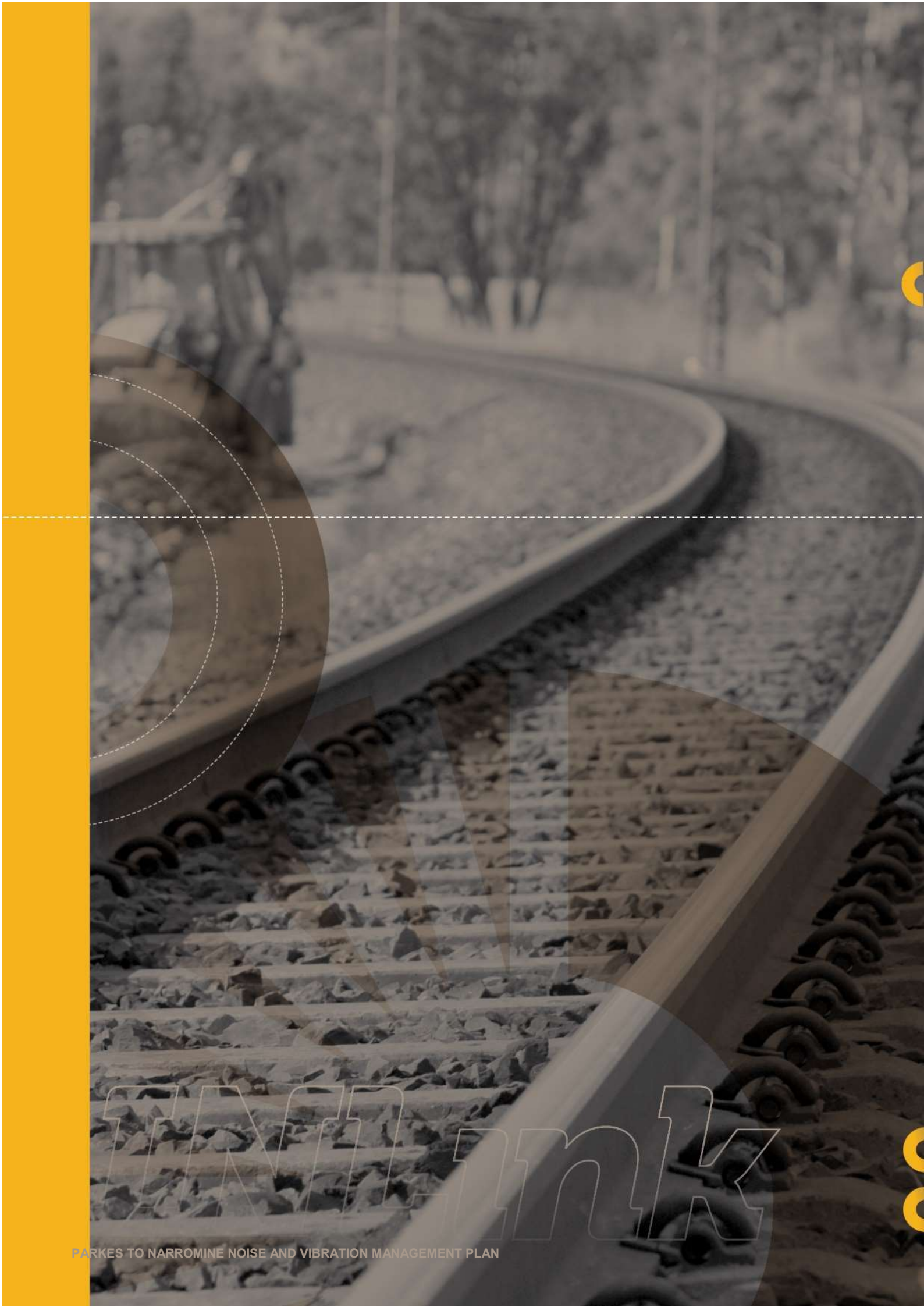
Sensitive Receiver Locations – Map 5

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Sensitive Receiver Locations – Map 6



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