Property Damage Sub-Plan

Cross River Rail – Rail, Integration and Systems Alliance

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Revision number:	08

Document Approval

Rev	Date	Prepared By	Reviewed By	Approved By	Remarks
A	03/04/20	Environmental Advisor - UNITY	Acoustic Specialist and Heritage Specialist - UNITY		IFR
B	17/05/20	Environmental Advisor - UNITY			IFR
00	29/05/20	Environmental Advisor - UNITY		Environmental and Approvals Manager - UNITY	IFU
01	21/06/20	Environmental Advisor - UNITY		Environmental and Approvals Manager - UNITY	IFU
02	06/07/20	Environmental Advisor – UNITY		Environmental and Approvals Manager - UNITY	IFU
03	21/09/20	Environmental Advisor – UNITY		Environmental and Approvals Manager - UNITY	IFU
04	05/02/21	Environmental Advisor – UNITY		Environmental and Approvals Manager - UNITY	IFR
05	19/03/21	Environmental Advisor – UNITY	Environmental and Approvals Manager - UNITY	Alliance Manager - UNTIY	IFU
06	15/04/21	Environmental Advisor – UNITY	Environmental and Approvals Manager - UNITY	Alliance Manager - UNTIY	IFR
07	17/05/21		Environmental and Approvals Manager - UNITY	Alliance Manager - UNTIY	IFU
08	28/08/21	Senior Environmental Representative	Environmental and Approvals Manager - UNITY		IFR
Signature:					

Plan Control

This Property Damage Sub-Plan (the plan) has been developed for the Cross River Rail – Rail, Integration and Systems Project.

Approvals, Revisions and Amendments

Plan approval is in accordance with Section 4.1.2 of the Construction Environmental Management Plan (C-EMP).

Plan reviews and updates is in accordance with Section 7 and Section 8.1 of the C-EMP.

Revision Details

Revision	Remarks
A	Plan developed based on the outcomes of the predictive vibration model and outcomes of building surveys Plan provided to UNITY's Heritage and Acoustic Specialist for internal review and comments
B	Plan updated to include Structural engineer reports and additional information Plan updated to include information relevant to Queensland Heritage Council Recommendations
00	Submission to Queensland Heritage Council Submission to the Environmental Monitor
01	Update to 8 Tufton Street Vibration Limits
02	Incorporation of F2S Vibration Model
03	Update to 8 Tufton Street Vibration Limits
04	Update to incorporate Yeronga Footbridge vibration model - IFR
05	Issued for Use
06	Inclusion of additional building condition surveys undertake March 2021 - IFR
07	Issued for review to the IEM 6 monthly review and update to incorporate • changes linked to RfPC-11 • addition of the Southern Area Scope of Works (Dutton Park and Buranda)

1 Purpose of this Plan

This sub-plan has been prepared to comply with:

- Coordinator-General's Imposed Condition – Appendix 1 – Part C:
  - Condition 12
- Final Outline-Environmental Management Plan (O-EMP) – Community and Stakeholder Engagement Plan
- Final Outline-Environmental Management Plan (O-EMP) – Non-Indigenous Heritage Management Plan.
- Queensland Heritage Council recommendation about Development by the state - 202002-10044 SD:
  - Condition 9 - Documentation of Construction Mitigation Measures
  - Condition 11 - Requirement to Report Damage
  - Condition 12 - Report on Post-Construction Building Condition Survey
  - Condition 13 - Damage Rectification

Component	Details
Outcome(s)	• Construction activities are managed to minimise impacts on the values of identified heritage places, within and adjacent to the construction worksites • Construction activities are managed to minimise property damage of residential, commercial and industrial property, within and adjacent to the construction worksites • Local communities, residents and businesses likely to be directly affected by potential property damage are aware of the nature, timing and predicted effects of the works in advance of their commencement • Potentially affected persons have access to an effective and responsive communication and complaints process to address and respond to property damage complaints • Ensure that the cultural heritage values of the place are appropriately managed
Relevant Area	• Heritage Buildings Where predictive modelling shows an exceedance of the recommended 2mm/s Peak particle Velocity threshold (PPV) for cosmetic damage – Refer Attachment 1 for details • Residential where predictive modelling shows an exceedance of 50mm/s PPV – There are no predicted exceedances of the residential vibration limit at any residential buildings • Industrial/Commercial where predictive modelling shows an exceedance of 50mm/s PPV – There are no predicted exceedances of the Vibration Limit at any Industrial or commercial buildings
Relevant Works / Activities	• Piling • Rock-breaking • General earthworks • Vibratory rolling • Jackhammering • Construction activities in close proximity to heritage, residential and commercial buildings.

<table>
<tr><th>Component</th><th>Details</th></tr>
<tr><td>Performance Criteria</td><td>

Construction activities do not permanently damage residential or commercial buildings directly or indirectly through excessive vibration
Construction activities do not permanently damage places of historical heritage value directly or indirectly through excessive vibration
Compliance with the limits set out in Table 2 or where limits recommended in the Condition Assessment and Vibration Susceptibility Assessments undertaken by the project structural engineer for identified DAPs (Directly Affected Persons) (Table 3).

Table 2: Vibration limits as per the Coordinator General Change Report (Condition 11, Table 3)
<table>
<tr><th rowspan="2">Receiver type</th><th colspan="3">Cosmetic damage</th><th colspan="2">Human comfort (mm/s PPV)</th><th rowspan="2">Sensitive building contents (mm/s PPV)</th></tr>
<tr><th>Continuous vibration (mm/s PPV)</th><th>Transient vibration (mm/s PPV)</th><th>Blasting vibration (mm/s PPV)</th><th>Day</th><th>Night</th></tr>
<tr><td>Residential</td><td>According to BS7385
reduced by 50%[4]</td><td>According to BS7385</td><td>50[1]</td><td>According to AS2670</td><td>0.5[2]</td><td>-</td></tr>
<tr><td>Commercial</td><td>According to BS7385
reduced by 50%[4]</td><td>According to BS7385</td><td>50</td><td>According to AS2670</td><td>-</td><td>0.5[3]</td></tr>
<tr><td>Heritage structures</td><td>2</td><td>-</td><td>10</td><td>-</td><td>-</td><td>-</td></tr>
</table>
Note 1: All residential receivers in the vicinity of the Project blasting sites are regarded as reinforced or framed structures (i.e. BS 7385).
Note 2: Residential sleep disturbance
Note 3: Equipment specific vibration criteria is required for highly sensitive equipment (i.e. electron microscopes, MRI systems or similar), as part of future site-specific detailed investigations.
Note 4: If resonance is present, or if investigations to detect resonance were not able to be undertaken due to a lack of access
Table 3: DIN4150 Structural damage criteria
Table 1: DIN 4150:Part 3: Structural Damage Criteria
<table>
<tr><th rowspan="3">Group</th><th rowspan="3">Type of Structure</th><th colspan="4">Peak Particle Velocity mm/s</th></tr>
<tr><th colspan="3">At Foundation</th><th rowspan="2">Plane of Floor Uppermost Storey</th></tr>
<tr><th>1HZ to 10Hz</th><th>10Hz to 50Hz</th><th>50Hz to 100Hz</th></tr>
<tr><td>1</td><td>Buildings used for commercial purposes, industrial buildings and buildings of similar design.</td><td>20</td><td>20 at 10Hz increasing to 40 at 50Hz</td><td>40 at 50Hz increasing to 50 at 100Hz</td><td>40</td></tr>
<tr><td>2</td><td>Dwellings and buildings of similar design and / or use.</td><td>5</td><td>5 at 10Hz increasing to 15 at 50Hz</td><td>15 at 50Hz increasing to 20 at 100Hz</td><td>15</td></tr>
<tr><td>3</td><td>Structures that because of their particular sensitivity to vibration, no not correspond to those listed in Group 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order).</td><td>3</td><td>3 at 10Hz increasing to 8 at 50Hz</td><td>8 at 50Hz increasing to 10 at 100Hz</td><td>8</td></tr>
</table>
</td></tr>
<tr><td>Sustainability</td><td>Sta-1, Sta-2, Sta-4,
Her-1, Her-2,
Dis-3,
Man-4</td></tr>
<tr><td>Mitigation Measure</td><td>Prior to Construction

Undertake predictive vibration modelling in accordance with the Noise and Vibration management Sub-plan

</td></tr>
</table>

Component	Details
	• Confirm the list of Buildings requiring pre-condition surveys (refer Attachment 2) • Undertake precondition building condition surveys by a suitably qualified person (typically structural engineer or equivalent) prior to works, including the provision for consultation with property owners and occupants • Structural Engineer to determine the actual building specific vibration goals based on the findings of their assessment (Attachment 3) • Brief owners/occupiers of properties requiring a survey/report via letter or in person (if required) and answer any enquiries about the process in accordance with the Community Engagement Plan • All personnel involved in, or supervising construction works will complete the heritage, community, noise and vibration portion of the site induction. Further inductions and toolboxes to be run when relevant works are commencing • For all impact to state heritage places, obtain the relevant approvals or exemptions under the *Queensland Heritage Act 1992* • For all impacts to QR or BCC heritage places (other than state heritage places), notify the relevant Stakeholders prior to the relevant works commencing • Prepare a building specific vibration monitoring plan where deemed necessary by the project structural engineer. This is to include the acceptable limits, location, frequency and timing of the monitoring as well as the activities triggering the need for vibration monitoring. • For Heritage Buildings to be demolished – undertake Archival recording as agreed with relevant Heritage Departments prior to demolition **During Construction** • Comply with the relevant Heritage Approvals throughout the works • Incorporate the construction requirements for the management of heritage values and potential property damage in the relevant work packs and SEPs • Implement the vibration monitoring plans • Any damage to State Listed building fabric and/or significant elements or artefacts must be reported to the Department of Environment and Science. **Post Construction** • A suitably qualified person is to undertake a post construction dilapidation survey to identify changes (if any) to the structure. • Undertake repairs as required by either the – Heritage Approvals requirements (Burra Charter), or – The agreed rectification plan with the property owner • For State Heritage Listed Building the timing, method and extent of the repair works must be agreed to with the DES and implemented within a timeframe agreed with the DES Heritage Unit. **Complaints** • All complaints pertaining to property damage will be managed in accordance with the requirements of the community engagement plan and with the support of the Community and Stakeholder and Engagement team (CSET) as necessary.
Monitoring	• Monitoring of residential and commercial / industrial buildings will be undertaken in response to validated complaints and as agreed with property owners • Monitoring for Heritage buildings will be undertaken as per Attachment 4 to Attachment 7 • Visual site inspections may be undertaken during scheduled weekly inspections
Reporting	• Reporting will be undertaken in accordance with the approved heritage impact statements and associated heritage permit conditions. • Alternatively, reporting will be in accordance with section 8.2 of the C-EMP.
Corrective Action	• Management of corrective actions will be undertaken in accordance with imposed heritage approvals conditions • Alternatively, management of corrective actions will be as per section 6 of the C-EMP
Auditing	• Auditing will be undertaken in accordance with the relevant Heritage Approvals • Alternatively, auditing will be as per section 7 of the C-EMP.

Attachment 1 List of sensitive buildings along the project Footprint

Area	HIS Reference (If applicable)	Location	Type of Structure	CGCR vibration goals for cosmetic damage
RNA Precinct / Northern Corridor		8 Tufton Street, Bowen Hills	Residential / Local Heritage	2mm/s
RNA Showgrounds	ID01	John MacDonald Stand	State Heritage	2mm/s
RNA Showgrounds	ID02	Toilet Block (John MacDonald Stand)	State Heritage	2mm/s
RNA Showgrounds	ID03	Toilet Block (Interwar)	State Heritage	2mm/s
RNA Showgrounds	ID05	Rail Corridor Fencing	State Heritage	2mm/s
RNA Showgrounds	ID06	Wall (Bowen Bridge Road)	State Heritage	2mm/s
RNA Showgrounds	ID08	Turnstiles	State Heritage	2mm/s
RNA Showgrounds	ID09	Beef Cattle Pavilion	State Heritage	2mm/s
RNA Showgrounds	ID13	Cattle Underpass	State Heritage	2mm/s
RNA Showgrounds	ID14	Rail Corridor Fencing	State Heritage	2mm/s
RNA Showgrounds	ID15	Toilet Block (O'Connell Terrace)	State Heritage	2mm/s
RNA Showgrounds	ID16	Members Stand	State Heritage	2mm/s
RNA Showgrounds	ID17	RNA Council Stand	State Heritage	2mm/s
RNA Showgrounds	ID18	Former Commonwealth Bank Building	State Heritage	2mm/s
RNA Showgrounds	ID19 and ID70	Machinery Hill Stands including cattleman's box	State Heritage	2mm/s
RNA Showgrounds	ID21	Ernest Baynes Stand	State Heritage	2 mm/s
RNA Showgrounds	ID22	Marshalling Yard and Stands	State Heritage	2mm/s
RNA Showgrounds	ID24	Commentators Building	State Heritage	2mm/s
RNA Showgrounds	ID25	Industrial Pavilion (facade)	State Heritage	2mm/s
RNA Showgrounds	ID27	Stock Pavilion and adjoining toilet block	State Heritage	2mm/s
RNA Showgrounds	ID29	Horse Stables	State Heritage	2mm/s
RNA Showgrounds	ID30	Horse Stalls	State Heritage	2mm/s
RNA Showgrounds	ID31	Stock Agents Offices	State Heritage	2mm/s
RNA Showgrounds	ID32	Stockman's Bar and Grill	State Heritage	2mm/s
RNA Showgrounds	ID33	Toilet Block	State Heritage	2mm/s
RNA Showgrounds	ID34	Lady Forster Building	State Heritage	2mm/s
RNA Showgrounds	ID50	Wall (O'Connell Terrace)	State Heritage	2mm/s
RNA Showgrounds	ID51	Wall – Brookes Street	State Heritage	2mm/s
RNA Showgrounds	ID52, 53 and 54	Gregory Terrace fence, wall and gates	State Heritage	2mm/s
RNA Showgrounds	ID58	Pedestrian Underpass	State Heritage	2mm/s
RNA Showgrounds	ID62	Fence	State Heritage	2mm/s
RNA Showgrounds	ID65	Retaining Wall	State Heritage	2mm/s

Area	HIS Reference (If applicable)	Location	Type of Structure	CGCR vibration goals for cosmetic damage
RNA Showgrounds	ID68	Community Swimming Club café	State Heritage	2mm/s
RNA Showgrounds	ID69	Lady Competitors Box	State Heritage	2mm/s
RNA Showgrounds	ID71	Entry Shed – O'Connell Terrace	State Heritage	2mm/s
RNA Showgrounds	ID91	RNA Showgrounds Vet Office and Quarters	State Heritage	2mm/s
Northern Corridor		Brisbane Girls Grammar School – Main Building	Local Heritage	2mm/s
Northern Corridor		Brisbane Girls Grammar School – Western Wing	Local Heritage	2mm/s
Northern Corridor		Brisbane Grammar School	State Heritage	2mm/s
Northern Corridor		Old Museum Building	State heritage	2mm/s
Southern Area		Dutton Park Shelter	QR Heritage	2mm/s
Southern Area		Hefferan Park Air Raid Shelter	State Heritage	2mm/s
F2S		Fairfield Station – Platform Shelter	QR Heritage	2mm/s
F2S		Fairfield Station - Footbridge	QR Heritage	2mm/s
F2S		Fairfield Passenger Station	QR Heritage	2mm/s
F2S		Yeronga Station Footbridge	Local Heritage/QR Heritage	2mm/s
F2S		Yeerongpilly Passenger Station	QR Heritage	2mm/s
F2S		Rocklea Passenger Station	QR Heritage	2mm/s
F2S		Rocklea Platform Shelter	QR Heritage	2mm/s
F2S		Rocklea Footbridge	QR Heritage	2mm/s
F2S		Salisbury Passenger Station	QR Heritage	2mm/s
F2S		Salisbury Footbridge	QR Heritage	2mm/s
F2S		10/12 Killarney Street	Local Heritage	2mm/s

Attachment 2 Predictive Vibration Model Outcomes

The below table summarises the outcomes of the Predictive Vibration Model. This table may be amended as further modelling or building condition surveys are undertaken.

Area	HIS Reference (If applicable)	Location	Exceedance of CGCR Cosmetic Vibration Goals Predicted?	Building condition surveys required?
RNA Precinct / Northern Corridor		8 Tufton Street, Bowen Hills	Yes	Yes – Survey undertaken 10 June 2020
RNA Showgrounds	ID01	John MacDonald Stand	Yes	Yes – Survey undertaken on 23 January 2020
RNA Showgrounds	ID02	Toilet Block (John MacDonald Stand)	Yes	Yes – Survey undertaken on 23 January 2020
RNA Showgrounds	ID03	Toilet Block (Interwar)	Yes	To be demolished Archival Recording only
RNA Showgrounds	ID05	Rail Corridor Fencing	Yes	To be demolished – Survey undertaken on 6 May 2020
RNA Showgrounds	ID06	Wall (Bowen Bridge Road)	Yes	Yes – Survey undertaken on 16 March 2021
RNA Showgrounds	ID08	Turnstiles	No	No
RNA Showgrounds	ID09	Beef Cattle Pavilion	Yes	Yes – Survey undertaken on 14 February 2020
RNA Showgrounds	ID13	Cattle Underpass	Yes	To be demolished - Archival recordings to be undertaken
RNA Showgrounds	ID14	Rail Corridor Fencing	No	No
RNA Showgrounds	ID15	Toilet Block (O'Connell Terrace)	Yes	To be demolished - Archival recordings to be undertaken
RNA Showgrounds	ID16	Members Stand	Yes	Yes – survey undertaken on 21 February 2020
RNA Showgrounds	ID17	RNA Council Stand	Yes	Yes – Survey undertaken on 16 March 2021
RNA Showgrounds	ID18	Former Commonwealth Bank Building	No	No
RNA Showgrounds	ID19 and ID70	Machinery Hill Stands including cattleman's box	Yes	Yes – Survey undertaken on 28 April 2020
RNA Showgrounds	ID21	Ernest Baynes Stand	Yes	Yes – Survey undertaken 6 May 2020
RNA Showgrounds	ID22	Marshalling Yard and Stands	No	No
RNA Showgrounds	ID24	Commentators Building	No	No
RNA Showgrounds	ID25	Industrial Pavilion (facade)	Yes	Yes – Survey undertaken on the 6 May 2020
RNA Showgrounds	ID27	Stock Pavilion	Yes	Yes – Survey undertaken on the 28 April 2020
RNA Showgrounds	ID29	Horse Stables	No	No

Area	HIS Reference (If applicable)	Location	Exceedance of CGCR Cosmetic Vibration Goals Predicted?	Building condition surveys required?
RNA Showgrounds	ID30	Horse Stalls	No	No
RNA Showgrounds	ID31	Stock Agents Offices	No	No
RNA Showgrounds	ID32	Stockman's Bar and Grille	No	No
RNA Showgrounds	ID33	Toilet block	No	No
RNA Showgrounds	ID34	Lady Forster Building	No	No
RNA Showgrounds	ID50	Wall (O'Connell Terrace)	Yes	Yes – Survey undertaken on 28th April 2020
RNA Showgrounds	ID51	Wall – Brookes Street	No	No
RNA Showgrounds	ID52, 53 and 54	Gregory Terrace fence, wall and gates	No	No
RNA Showgrounds	ID58	Pedestrian Underpass	Yes	To be demolished Archival Recording Only
RNA Showgrounds	ID62	Fence	No	No
RNA Showgrounds	ID65	Retaining Wall	No	To be demolished Archival Recording Only
RNA Showgrounds	ID68	Community Swimming Club café	Yes	Yes – Survey undertaken on 21 February
RNA Showgrounds	ID69	Lady Competitors Box	No	No
RNA Showgrounds	ID71	Entry Shed – O'Connell Terrace	No	No
RNA Showgrounds	ID91	RNA Showgrounds Vet Office and Quarters	Yes	To be demolished Archival Recording Only Survey undertaken on the 14 February 2020 in the event demolition does not proceed
Northern Corridor		Brisbane Girls Grammar School – Main Building	No	No
Northern Corridor		Brisbane Girls Grammar School – Western Wing	No	No
Northern Corridor		Brisbane Grammar School	No	No
Northern Corridor		Old Museum Building	Yes	Yes – Survey undertaken on 25 March 2021
Southern		Dutton Park Shelter	Yes	To be demolished Archival Recording Only

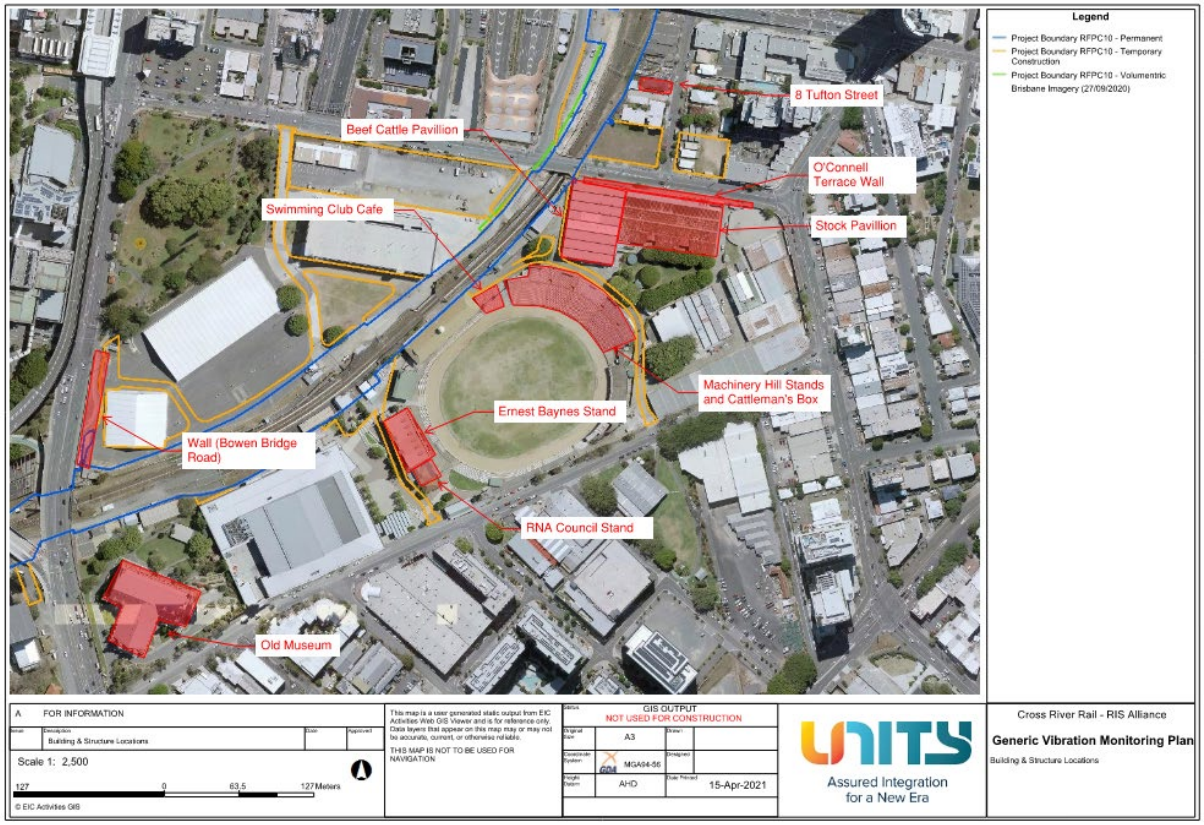
Area	HIS Reference (If applicable)	Location	Exceedance of CGCR Cosmetic Vibration Goals Predicted?	Building condition surveys required?
Southern		Hefferan Park Air Raid Shelter	Yes	Yes To be conducted prior to vibration intensive works commencing
F2S		Fairfield Station – Platform Shelter	Awaiting updated vibration model	To be demolished Archival Recording Only
F2S		Fairfield Station - Footbridge	Awaiting updated vibration model	To be demolished Archival Recording Only
F2S		Fairfield Passenger Station	Awaiting updated vibration model	To be demolished Archival Recording Only
F2S		Yeronga Station Footbridge	Awaiting updated vibration model	To be demolished Archival Recording Only
F2S		Yeerongpilly Passenger Station	Awaiting updated vibration model	To be demolished Archival Recording Only
F2S		Rocklea Passenger Station	Awaiting updated vibration model	To be demolished Archival Recording Only
F2S		Rocklea Platform Shelter	Awaiting updated vibration model	To be demolished Archival Recording Only
F2S		Rocklea Footbridge	Awaiting updated vibration model	To be demolished Archival Recording Only
F2S		Salisbury Passenger Station	Awaiting updated vibration model	To be demolished Archival Recording Only
F2S		Salisbury Footbridge	Awaiting updated vibration model	To be demolished Archival Recording Only
F2S		10/12 Killarney Street, Yeronga	Yes	Desktop analysis undertaken by structural engineer 02/02/21

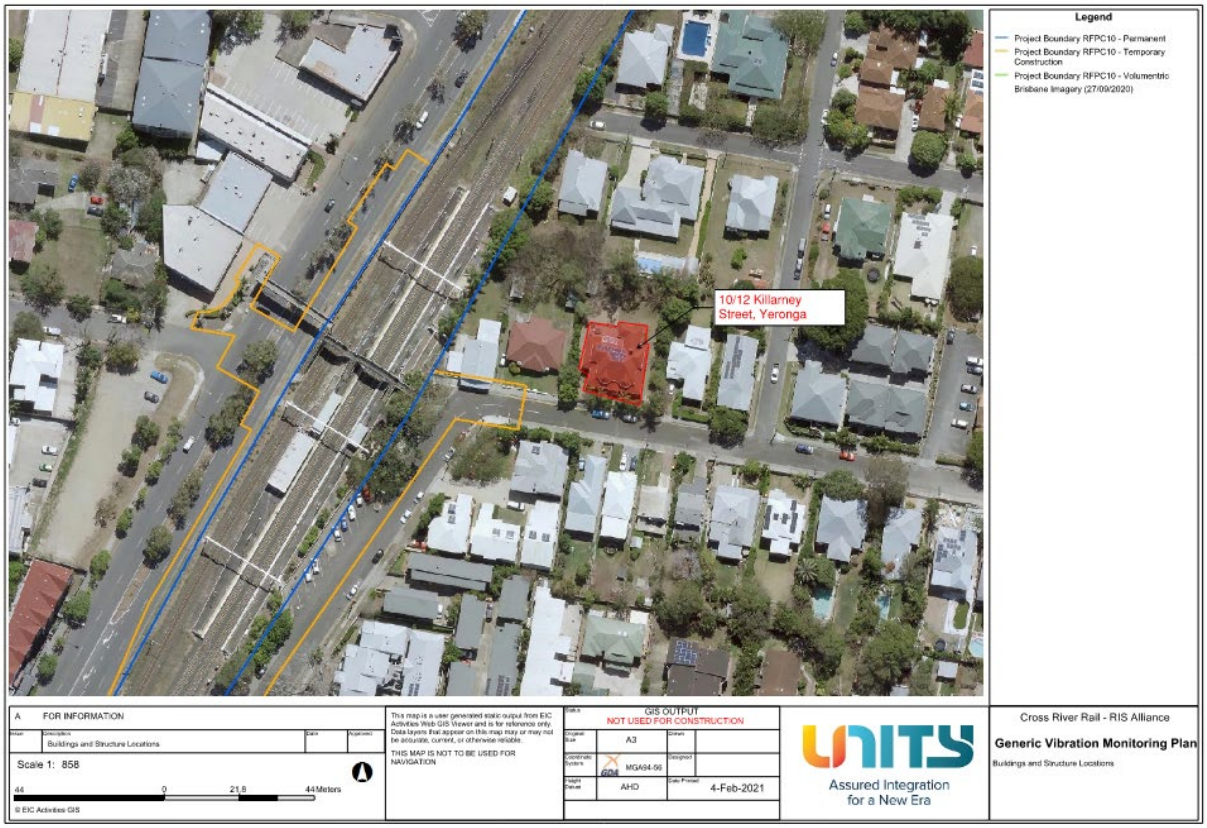
Attachment 3 Revised Vibration Limits (dependant on frequency) and Associated Recommended monitoring Program

Area	Locations	Revised Vibration Limit (dependant on frequency)	Relevant Project Works / Predicted vibration levels	Exceedance of revised limit Predicted?	Monitoring Program recommended
RNA Precinct / Northern Corridor	8 Tufton Street, Bowen Hills	Group 2 DIN4150 5mm/s-15mm/s	Stage 1 Modelling: 4.8mm/s	No	Generic Refer Attachment 4
RNA Showgrounds	Wall (O'Connell Terrace) ID50	Group 1 DIN4150 20mm/s-40mm/s	Stage 1 modelling: 8mm/s	No	Generic Refer Attachment 4
RNA Showgrounds	Beef Cattle Pavilion ID09	Group 1 DIN4150 20mm/s-40mm/s	Stage 1 modelling: 8mm/s	No	Generic Refer Attachment 4
RNA Showgrounds	Stock Pavilion ID27	Group 1 DIN4150 20mm/s-40mm/s	Stage 1 Modelling: 3mm/s	No	Generic Refer Attachment 4
RNA Showgrounds	Machinery Hill Stands including cattleman's box ID70 and ID19	Group 1 DIN4150 20mm/s-40mm/s	Stage 1 Modelling: 5mm/s	No	Generic Refer Attachment 4
RNA Showgrounds	Community Swimming Club café ID68	Group 1 DIN4150 20mm/s-40mm/s	Stage 1 Modelling: 6mm/s	No	Generic Refer Attachment 4
RNA Showgrounds	John MacDonald Stand ID01	Group 3 DIN4150 3mm/s-10mm/s	Demolition works modelling: 10mm/s Station demolition works modelling: 45mm/s	Yes	Specific Refer Attachment 6
RNA Showgrounds	Members Stand ID16	Group 1 DIN4150 20mm/s-40mm/s	Stage 1 works modelling: 37mm/s	Yes	Specific Refer Attachment 7
RNA Showgrounds	Ernest Baynes Stand ID21	Group 1 DIN4150 20mm/s-40mm/s	Stage 1 Modelling: 7mm/s	No	Generic Refer Attachment 4
RNA Showgrounds	RNA Council Stand ID17	Group 1 DIN4150 20mm/s-40mm/s	Demolition works modelling: 2mm/s Station demolition works modelling: 2.5mm/s	No	Generic Refer Attachment 4
RNA Showgrounds	Industrial Pavilion (facade) ID25	Group 1 DIN4150 3mm/s-10mm/s	Stage 1 works modelling: 3.5mm/s	Yes	Specific Refer Attachment 5
Northern/RNA Showgrounds	Old Museum Building	Group 1 DIN4150 20mm/s-40mm/s	Stage 1 works modelling: 3mm/s	No	Generic Refer Attachment 4
F2S	10/12 Killarney Street, Yeronga	Group 2 DIN4150 5mm/s-15mm/s	Pedestrian Overpass demolition: 2.5mm/s	No	Generic Refer Attachment 4
RNA Showgrounds	Wall (Bowen Bridge Road) ID06	Group 1 DIN4150 20mm/s-40mm/s	Track works 2mm/s	No	Generic Refer Attachment 4
Southern	Hefferan Park Air Raid Shelter	To be determined (TBD)	TBD	TBD	TBD

Attachment 4 Generic Vibration Monitoring Plan

- Location of affected buildings: identified in Attachment 3 and below figures.





- Vibration limits (DIN4150)

The buildings identified have all been deemed to be in group 1 or group 2 as per the below Table (refer to Attachment 3).

Initial Action levels are to be nominated based on the most conservative limits for the Building Group.

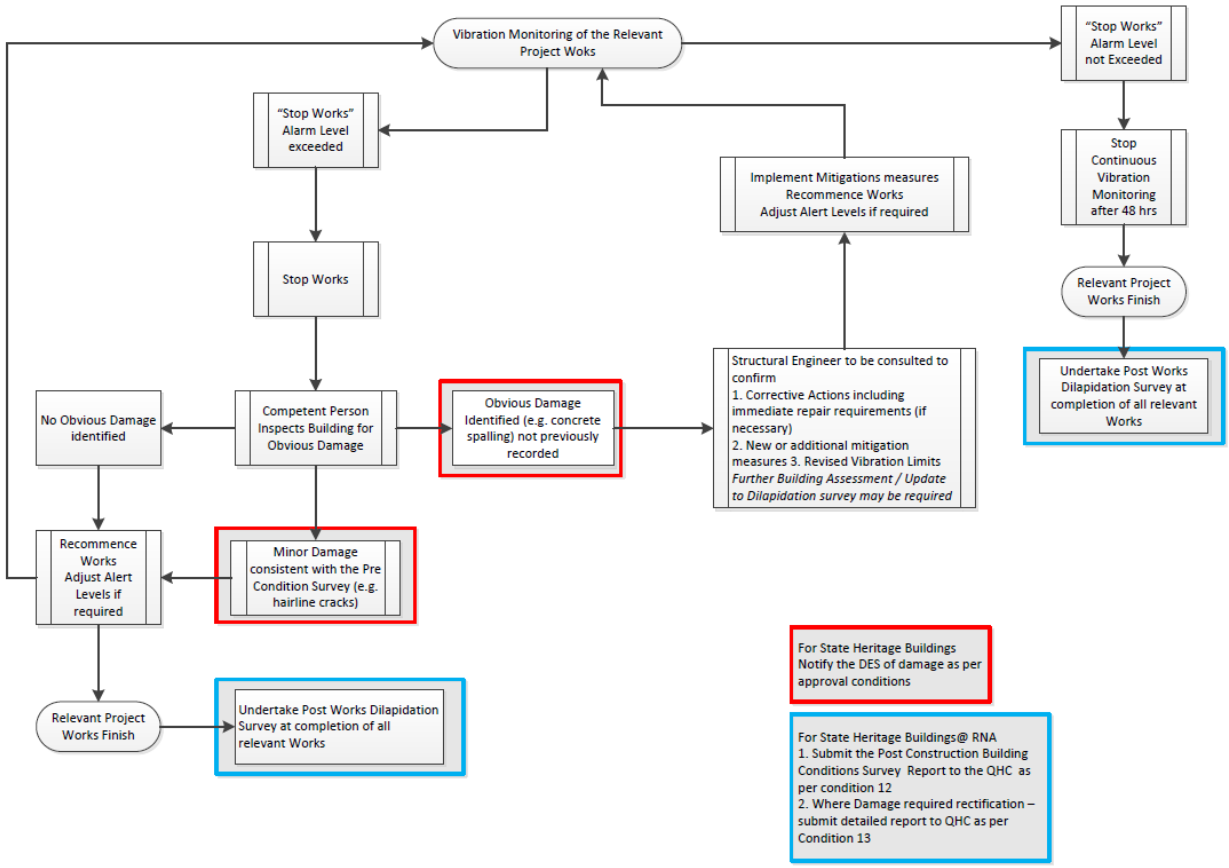
The Action Levels may be revised as monitoring data are reviewed.

Group	Type of Structure	Peak Particle Velocity mm/s			
		At Foundation			Plane of Floor Uppermost Storey
		1HZ to 10Hz	10Hz to 50Hz	50Hz to 100Hz	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design.	20	20 at 10Hz increasing to 40 at 50Hz	40 at 50Hz increasing to 50 at 100Hz	40
2	Dwellings and buildings of similar design and / or use.	5	5 at 10Hz increasing to 15 at 50Hz	15 at 50Hz increasing to 20 at 100Hz	15
3	Structures that because of their particular sensitivity to vibration, no not correspond to those listed in Group 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order).	3	3 at 10Hz increasing to 8 at 50Hz	8 at 50Hz increasing to 10 at 100Hz	8

- Relevant Project Works (Stage 1):
  - RNA Showgrounds – Stage 1 building demolition
  - RNA Showgrounds – Retaining wall removal with jackhammer
  - RNA Showgrounds – O'Connell Terrace / Rail corridor Rock breaking
  - RNA Showgrounds – Track and capping works with Vibratory Roller
  - RNA Showgrounds – Piling Works
  - RNA Showgrounds – Platform demolition
  - Yeronga Station – Overpass demolition
  - Any other Project Works deemed to be high risk by the acoustic team
- Relevant Construction Equipment:
  - Excavator with hydraulic hammer attachment
  - Jackhammer (hand-held)
  - Vibratory roller
  - Piling Equipment
  - Any other activity deemed to be high risk by the acoustic team
- Monitoring Equipment:
  - SYSCOM MR3000C or
  - Texcel ETM or
  - Similar models of vibration meters
- Action Levels to be used for the vibration monitors:
  - Alert – 16mm/s for group 1 and 4mm/s for group 2 (early warning – no action required) and
  - Stop Works Alarm – 19mm/s for group 1 and 4.5mm/s for group 2
- Monitoring Procedure:

- Set up of vibration meter at the closest location between the directly affected building and where the works are occurring
- Set up real time alerts on the vibration meter based on the Action Levels detailed before.
- Monitoring Data to be reviewed as they are collected and compared against the predictive assessment
  - If the model is verified as accurate or as conservative by the acoustic team, vibration monitoring can be ceased at the specific building after two (2) full days of monitoring.
  - If the monitoring data indicate that the model under-predicted potential exceedances – monitoring must continue at additional set back distances (to be nominated) to ascertain whether additional buildings need to be considered for dilapidation surveys.
- Implement the monitoring response procedure as detailed in the below flowchart.

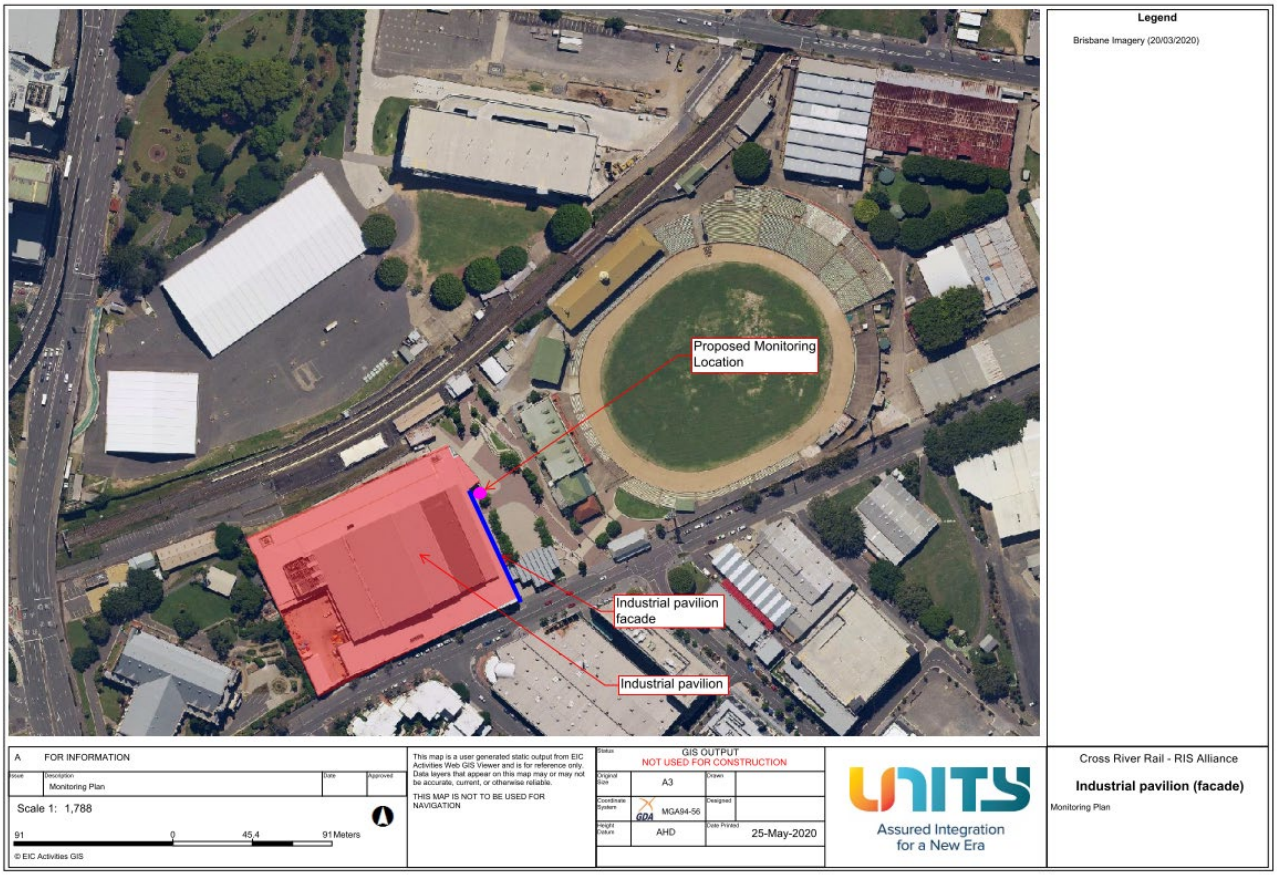
NOTE: In the event that two or more buildings are affected by the same activity, preference will be given to monitoring the building that is either the closest to the works or the one with the higher heritage value.



Flowchart 1: Monitoring Response Procedure

Attachment 5 Industrial Pavilion (façade) Specific Monitoring plan

- Location of affected building:



- Vibration limits:

The industrial pavilion facade has been deemed to be in group 3 in the below table.

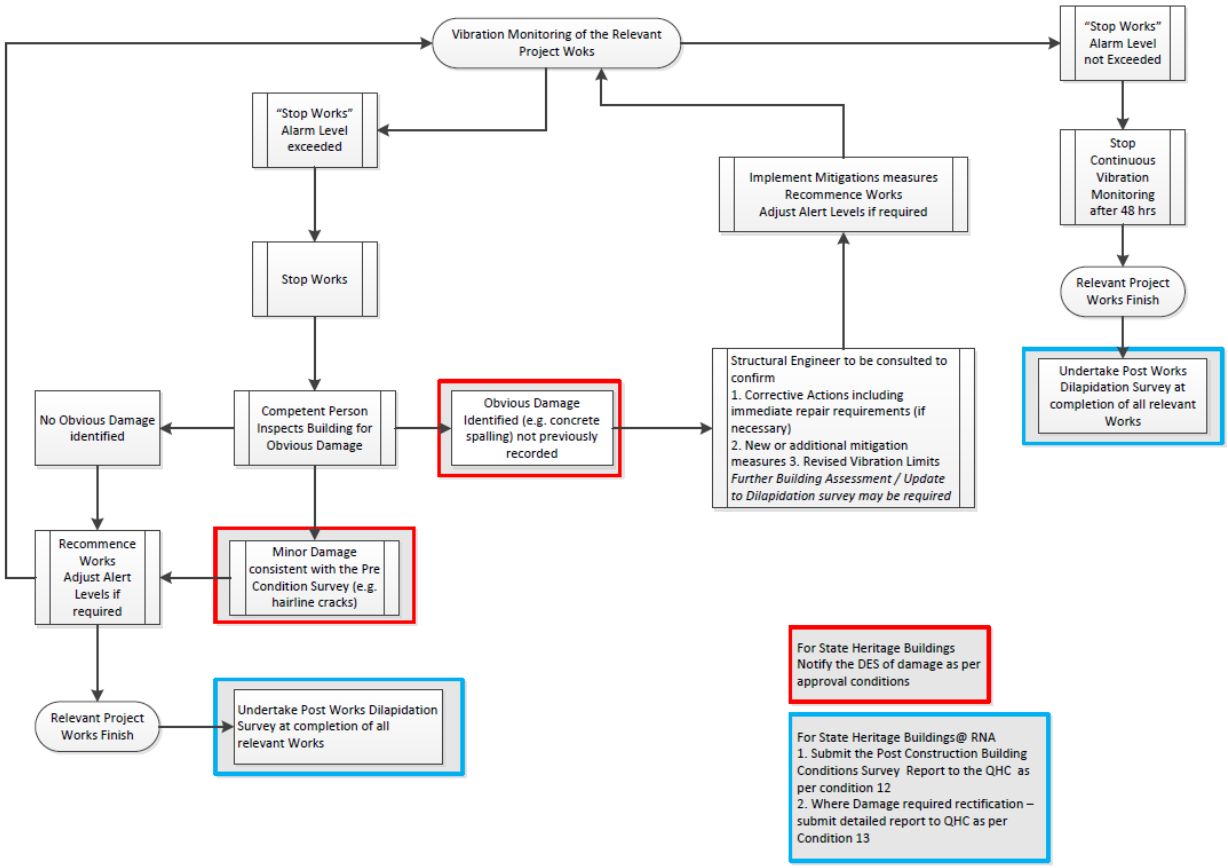
Group	Type of Structure	Peak Particle Velocity mm/s			
		At Foundation			Plane of Floor Uppermost Storey
		1HZ to 10Hz	10Hz to 50Hz	50Hz to 100Hz	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design.	20	20 at 10Hz increasing to 40 at 50Hz	40 at 50Hz increasing to 50 at 100Hz	40
2	Dwellings and buildings of similar design and / or use.	5	5 at 10Hz increasing to 15 at 50Hz	15 at 50Hz increasing to 20 at 100Hz	15
3	Structures that because of their particular sensitivity to vibration, no not correspond to those listed in Group 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order).	3	3 at 10Hz increasing to 8 at 50Hz	8 at 50Hz increasing to 10 at 100Hz	8

- Relevant Project Works:
  - Exhibition – Stage 1 building demolition
  - Platform Demolition

- Relevant Construction Equipment:
  - Excavator with hydraulic hammer attachment
  - Jackhammer
  - Vibratory roller
  - Any other activity deemed to be high risk by the acoustic team
- Monitoring Equipment:
  - SYSCOM MR3000C or
  - Texcel ETM or
  - Similar models of vibration meters
- Action levels to be used for the vibration monitors:
  - Alert – 2mm/s (early warning – no action required) and
  - Stop Works Alarm – 2.5mm/s
- Monitoring Procedure:
  - Set up of vibration meter at the closest location between the directly affected building and where the works are occurring
  - Set up real time alerts on the vibration meter based on the Action Levels detailed before.
  - Commence Relevant Project Works at a setback distance[1]
  - Monitoring Data to be reviewed as they are collected and compared against the predictive assessment
    - If the model is verified as accurate or as conservative by the acoustic team, vibration monitoring can be ceased at the specific building after two (2) full days of monitoring and the setback distance will be voided.
    - If the monitoring data indicate that the model under-predicted potential exceedances – monitoring must continue at additional set back distances (to be nominated) to ascertain whether additional buildings need to be considered for dilapidation surveys.
  - Implement the monitoring response procedure as detailed in the below flowchart.

NOTE: In the event that two or more buildings are affected by the same activity, preference of monitoring will be given to the buildings with the greater potential exceedance

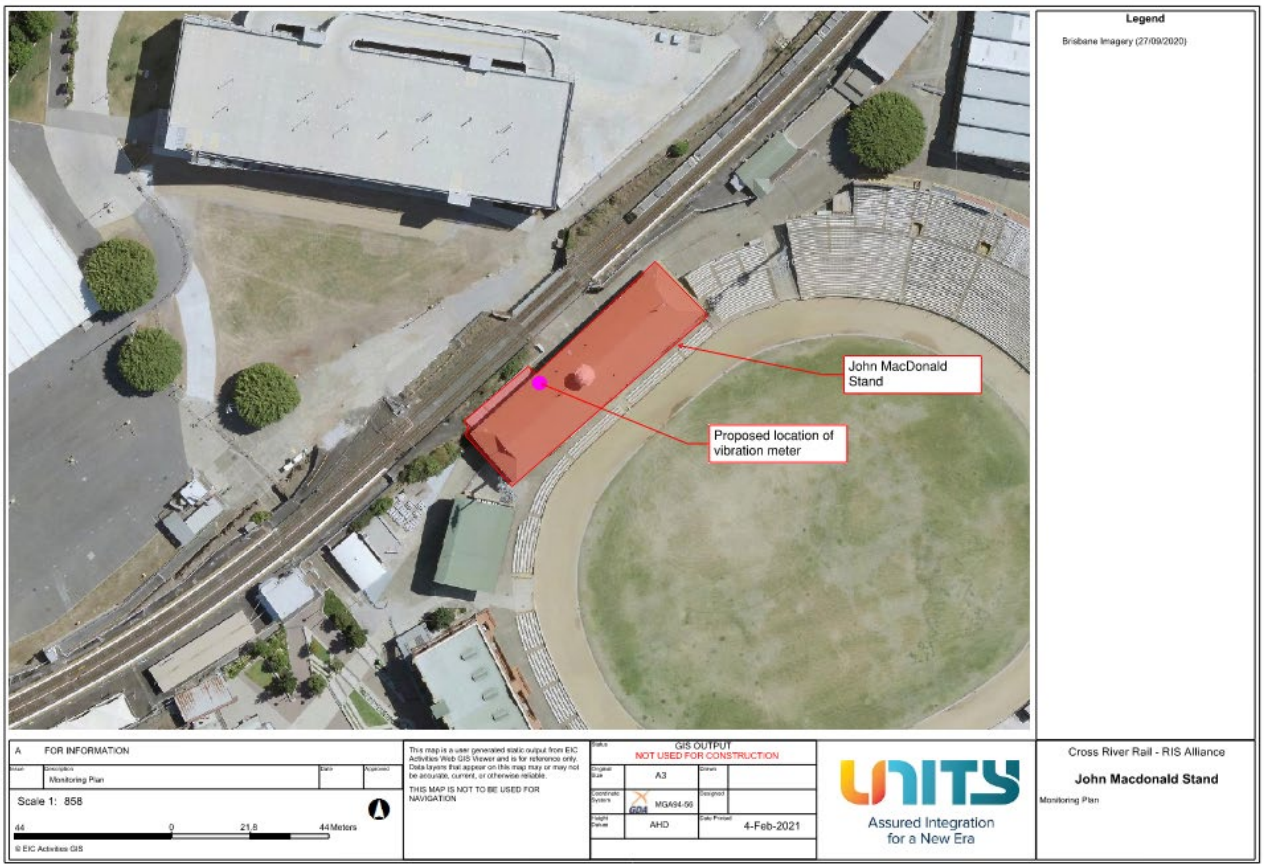
[1] Set back distance: distance from the affected building at which the relevant project works at not predicted to exceed the action levels. This distance is to be set based on the predictive assessment



Flowchart 1: Monitoring Response Procedure

Attachment 6 John MacDonald Stand Specific Monitoring Plan

- Location of affected building:



- Vibration limits:

The John MacDonald Stand has been deemed to be in group 3 in the below table.

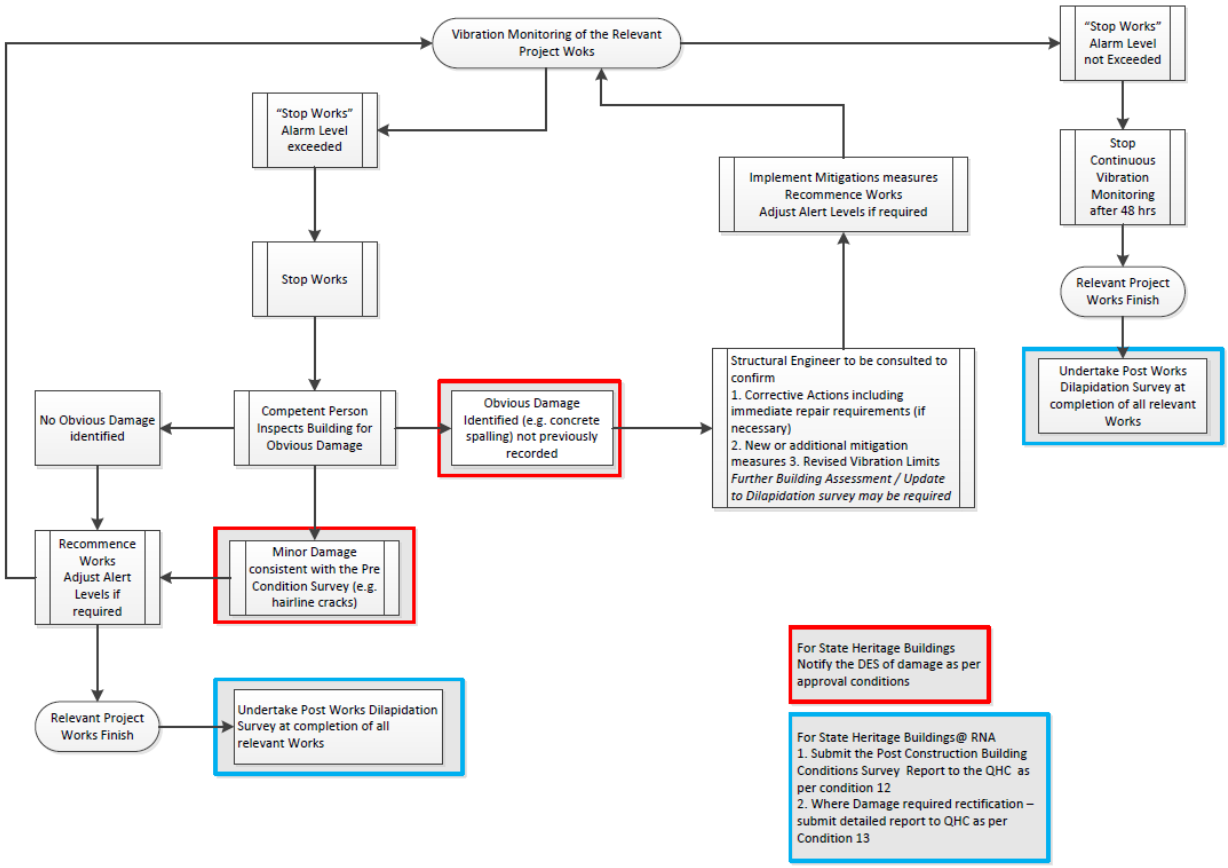
Group	Type of Structure	Peak Particle Velocity mm/s			
		At Foundation			Plane of Floor Uppermost Storey
		1HZ to 10Hz	10Hz to 50Hz	50Hz to 100Hz	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design.	20	20 at 10Hz increasing to 40 at 50Hz	40 at 50Hz increasing to 50 at 100Hz	40
2	Dwellings and buildings of similar design and / or use.	5	5 at 10Hz increasing to 15 at 50Hz	15 at 50Hz increasing to 20 at 100Hz	15
3	Structures that because of their particular sensitivity to vibration, no not correspond to those listed in Group 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order).	3	3 at 10Hz increasing to 8 at 50Hz	8 at 50Hz increasing to 10 at 100Hz	8

- Relevant Project Works
  - Exhibition – Stage 1 building demolition
  - O'Connell Terrace rock breaking activities

- Monitoring Equipment:
  - SYSCOM MR3000C
- Relevant Construction equipment:
  - - Excavator with hammer attachment
  - - Jackhammer
  - - Vibratory roller
  - - Any other activity deemed to be high risk by the acoustic team
- Action levels to be used for the vibration monitors:
  - Alert – 2mm/s (early warning – no action required) OR 75% of the DIN4150 limits for group 3 and
  - Stop Works Alarm – 2.5mm/s OR 90% of the DIN4150 limits for group 3
- Monitoring Procedure:
  - Set up of vibration meter at the closest location between the directly affected building and where the works are occurring
  - Set up real time alerts on the vibration meter based on the Action Levels detailed before.
  - Commence Relevant Project Works at a setback distance[2]
  - Monitoring Data to be reviewed as they are collected and compared against the predictive assessment
    - If the model is verified as accurate or as conservative by the acoustic team, vibration monitoring can be ceased at the specific building after two (2) full days of monitoring and the setback distance will be voided.
    - If the monitoring data indicate that the model under-predicted potential exceedances – monitoring must continue at additional set back distances (to be nominated) to ascertain whether additional buildings need to be considered for dilapidation surveys.
  - Implement the monitoring response procedure as detailed in the below flowchart.

NOTE: In the event that two or more buildings are affected by the same activity, preference of monitoring will be given to the John MacDonald Stand.

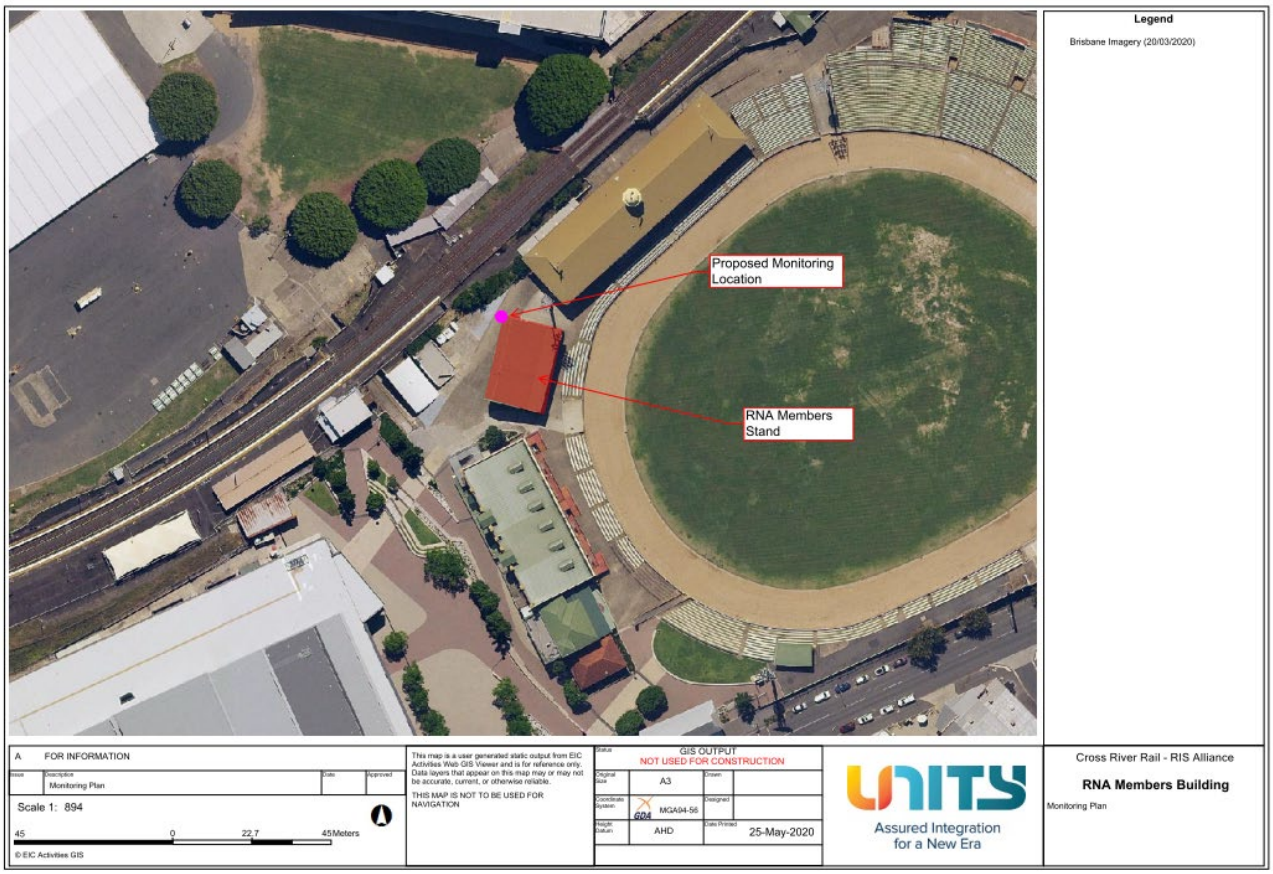
[2] Set back distance: distance from the affected building at which the relevant project works at not predicted to exceed the action levels. This distance is to be set based on the predictive assessment



Flowchart 1: Monitoring Response Procedure

Attachment 7 RNA Members Stand Specific Monitoring

- Location of affected building:



- Vibration limits:

The RNA members stand has been deemed to be in group 1 in the below table.

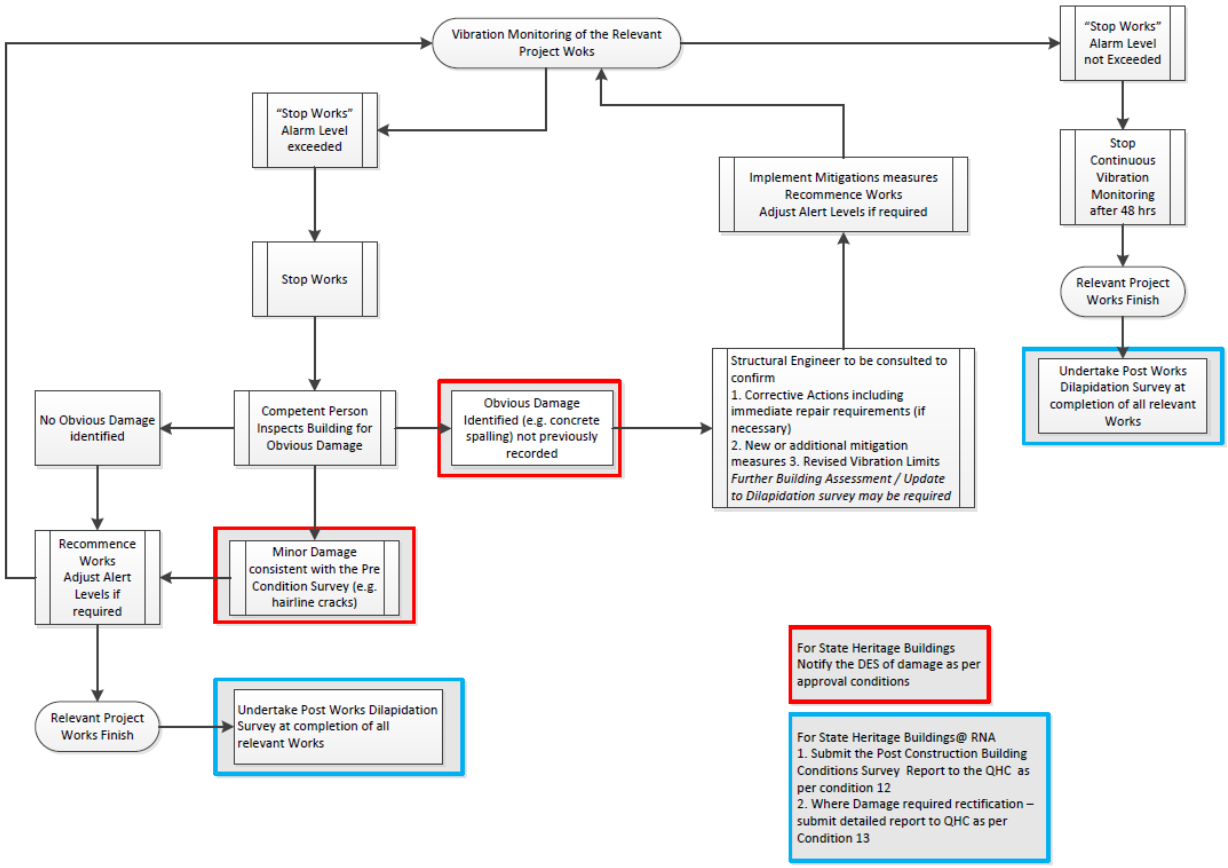
Group	Type of Structure	Peak Particle Velocity mm/s			
		At Foundation			Plane of Floor Uppermost Storey
		1HZ to 10Hz	10Hz to 50Hz	50Hz to 100Hz	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design.	20	20 at 10Hz increasing to 40 at 50Hz	40 at 50Hz increasing to 50 at 100Hz	40
2	Dwellings and buildings of similar design and / or use.	5	5 at 10Hz increasing to 15 at 50Hz	15 at 50Hz increasing to 20 at 100Hz	15
3	Structures that because of their particular sensitivity to vibration, no not correspond to those listed in Group 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order).	3	3 at 10Hz increasing to 8 at 50Hz	8 at 50Hz increasing to 10 at 100Hz	8

- Relevant Project Works:
  - Exhibition – Stage 1 building demolition
- Relevant Construction Equipment:
  - Excavator with hammer attachment

  - Jackhammer
  - Vibratory roller
  - Any other activity deemed to be high risk by the acoustic team
- Monitoring Equipment:
  - SYSCOM MR3000C or
  - Texcel ETM or
  - Similar models of vibration meters
- Action levels to be used for the vibration monitors:
  - Alert – 16 mm/s (early warning – no action required) and
  - Stop Works Alarm – 19mm/s
- Monitoring Procedure:
  - Set up of vibration meter at the closest location between the directly affected building and where the works are occurring
  - Set up real time alerts on the vibration meter based on the Action Levels detailed before.
  - Commence Relevant Project Works at a setback distance[3]
  - Monitoring Data to be reviewed as they are collected and compared against the predictive assessment
    - If the model is verified as accurate or as conservative by the acoustic team, vibration monitoring can be ceased at the specific building after two (2) full days of monitoring and the setback distance will be voided.
    - If the monitoring data indicate that the model under-predicted potential exceedances – monitoring must continue at additional set back distances (to be nominated) to ascertain whether additional buildings need to be considered for dilapidation surveys.
  - Implement the monitoring response procedure as detailed in the below flowchart.

NOTE: In the event that two or more buildings are affected by the same activity, preference of monitoring will be given to the buildings with the greater potential exceedance

[3] Set back distance: distance from the affected building at which the relevant project works are not predicted to exceed the action levels. This distance is to be set based on the predictive assessment



Flowchart 1: Monitoring Response Procedure