

**BEFORE AN INDEPENDENT HEARINGS PANEL
OF THE HAMILTON CITY COUNCIL**

IN THE MATTER of the Resource Management Act
1991 (**RMA**)

AND

IN THE MATTER of an application for resource
consent for the redevelopment of the
former Hamilton Hotel building at 170
Victoria Street, Hamilton CBD.

**STATEMENT OF EVIDENCE OF JAMES ROBERT HUGH BELL-BOOTH
ON BEHALF OF THE APPLICANT**

NOISE AND VIBRATION

1 October 2019

1. QUALIFICATIONS AND EXPERIENCE

- 1.1 My full name is James Robert Hugh Bell-Booth. I am a consultant in the acoustical consulting practice of Marshall Day Acoustics (MDA) and manager of its Hamilton office.
- 1.2 I hold the degree of Bachelor of Building Science from the University of Victoria, Wellington (2005). I am a Member of the Acoustical Society of New Zealand.
- 1.3 For the past 14 years I have worked in the field of acoustics, noise measurement and control in both New Zealand and Australia. My experience in acoustic advice in New Zealand has included assessment, prediction and modelling of sound and vibration for infrastructure, residential, commercial and industrial developments; the recommendation of mitigation measures when appropriate; and the preparation of noise performance standards for district plans. I have provided expert evidence on acoustic matters to council hearings on a number of occasions.
- 1.4 My notable projects include the University of Waikato campus developments, Farmers redevelopment in Tauranga, Wintec Campus developments, Wairere Drive widening, Waikato Expressway, and numerous Dairy processing facilities for Fonterra, Open Country Dairy and Tatua.
- 1.5 This evidence is in support of the application to Hamilton City Council (**Council**) by Waikato Regional Theatre Governance Panel (**the Applicant**) for resource consent to establish the Waikato Regional Theatre facility (**the Project**).
- 1.6 I have been engaged by the Applicant since September 2019. My experience and familiarity with the project is limited to the information submitted with the application relevant to construction noise and vibration.

2. CODE OF CONDUCT

- 2.1 My qualifications as an expert are set out above. I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014 and have complied with it in preparing this evidence. I confirm that the issues addressed in this evidence are within my area of expertise and I have not omitted material facts known to me that might alter or detract from my evidence.

3. SUMMARY OF EVIDENCE

3.1 I have been asked to provide evidence in relation to *construction noise and vibration*.

3.2 I prepared recommended consent conditions pertaining to construction noise and vibration in response to section 92 requests.

3.3 I have read the submissions received on the application and the Council Report.

3.4 My evidence will address the following aspects of the resource consent, which are within my area of expertise:

- a) The potential for effects from construction noise and vibration and typical management thereof;
- b) Comments on the Hamilton City Council Staff Report;
- c) Consideration of submissions; and
- d) Conclusion.

4. RELEVANT FACTS AND CONTEXT

4.1 I have relied on the description of the Project set out in the Application and the evidence of Mr David Pugh. However, in terms of my evidence the key aspects of the Project are construction noise and vibration.

5. CONSTRUCTION NOISE AND VIBRATION

5.1 I offer the following general statements to give context to the challenges of construction noise and vibration.

5.2 Exceedances of construction noise and vibration limits are common even when applying best practicable options (**BPO**) as required by section 16 of the RMA. This is particularly the case in built up areas, and especially where the construction project is relatively large and the distances between noise sources and receivers are small.

5.3 Large amounts of physical energy is required to demolish buildings, excavate earth, anchor building foundations and lift heavy materials. Sound and vibration are two of the

inevitable by-products of expending this energy. Basically, it is not possible to construct buildings quietly.

- 5.4** The Hamilton City Council's District Plan (**District Plan**) limits for construction noise state that "All construction noise shall comply with the relevant noise levels stated in NZS6803:1999, section 7.2 'Recommended numerical limits for construction noise' and shall be measured and assessed in accordance with NZS 6803:1999 'Acoustics – Construction Noise'"
- 5.5** The District Plan limits for construction vibration state that "Construction vibration received by any building on any other site shall comply with the provisions of and be measured and assessed in accordance with German Standard DIN 4150-3:1999 Structural vibration – Effects of vibration on structures.
- 5.6** The limits within the standards cannot reasonably be applied as absolute limits. Rather, they are thresholds that invoke a requirement to mitigate and manage noise in accordance with the BPO.
- 5.7** I have provided a recommendation for a suite of succinct construction noise and vibration conditions which require:
- a) Noise from construction works to comply as far as practicable with the relevant levels stated in NZS6803:1999
 - b) Vibration from construction to comply with the limits in Table 1 and Table 3 of DIN4150-3:1999
 - c) A Construction Noise and Vibration Management Plan (**CNVMP**) be prepared which gives effect to the construction noise and vibration performance standards and, amongst other objectives, defines the procedures to be followed when construction activities cannot meet the noise and vibration standards.
- 5.8** My recommendation for construction noise and vibration conditions can be found with the *Further Information Response (dated 30/08/2019)* in the document entitled '*Email Correspondence Updating Acoustic Conditions*'.

5.9 In my experience, the effects of construction noise and vibration are adequately controlled and reasonable when construction activities are conducted in accordance with the conditions I have recommended.

Potential Levels of Construction Noise and Vibration

5.10 A detailed construction noise and vibration assessment has not yet been completed for the project. This is typical at this point of a project, as at the consenting stage detailed construction methodologies are not yet defined.

5.11 I have calculated noise and vibration levels from a variety typical construction activities at 20m; the shortest distance between the proposed construction site and neighbouring buildings.

5.12 The most permissive period in NZS6803:1999 is Monday to Saturday between 7:30am and 6:00pm. The limit during this period for construction lasting more than 20 weeks is 70 dB L_{Aeq} at 1m from the most exposed façade of a building used for residential accommodation.

5.13 I have calculated that noise from unmitigated construction activities such as concrete breaking, concrete cutting and impact piling all have the potential to exceed the recommended numerical limit of 70 dB L_{Aeq} . The exceedance is up to 12 decibels. I stress that this is without any mitigation.

5.14 I have calculated that vibration from activities such as concrete breaking, impact piling and excavator movements are likely to comply with the DIN4150-3:1999 performance standards for Residential and Commercial receivers at 20m or greater.

5.15 A CNVMP would provide a detailed assessment of construction noise and vibration, specific mitigation measures (such as the use of silencers, mufflers, shielding, enclosures and barriers) and the procedures to be followed when construction activities cannot meet the noise and vibration standards.

5.16 This is typical for projects of this nature and, as I previously stated, I consider any effects of construction noise and vibration to be adequately controlled when construction activities are conducted in accordance with a CNVMP which fulfils the requirements set out in my proposed conditions.

6. COMMENTS ON THE COUNCIL STAFF REPORT

6.1 I have reviewed the Council Staff Report produced by Mr Cumberpatch and the acoustic assessment appended to the Council Staff Report prepared by Mr McGregor on behalf of the HCC processing team.

6.2 I largely concur with the findings of Mr Cumberpatch and Mr McGregor.

6.3 Mr McGregor has suggested amendments to my recommended conditions. His efforts were in the vain of providing additional assurances that the effects of construction noise and vibration on specifically identified properties would be addressed.

6.4 The additions can be summarised as:

- a) Increasing the time prior to construction that the CNVMP must be provided to Council (from 10 days to 20 days);
- b) Specifically identifying the residential apartments at 238 and 240 Victoria Street;
- c) Additions outlining what the CNVMP shall 'confirm and include';
- d) Construction noise limit tables and associated advice notes; and
- e) Vibration limit tables and associated advice notes.

6.5 In my opinion, many of the additions are unnecessary and over-complicate and lengthen the conditions.

Increase in processing time

6.6 I accept the 10 day increase in time required for Council to process the CNVMP.

Specifically identifying 238 and 240 Victoria Street

6.7 I consider that specifically identifying 238 and 240 Victoria Street in the conditions is a reaction to the submissions from the residents of these buildings.

6.8 It would be typical to first conduct a detailed assessment of construction noise and vibration via the CNVMP process, and subsequently identify whether these receivers are indeed affected.

Additions outlining what the CNVMP shall 'confirm and include'

6.9 I consider the additional detail in condition 72 unnecessary.

6.10 All of the additional detail is a reproduction of the relevant measures in the Annexes of NZS6803:1999 with the exception of specifically identifying 238 and 240 Victoria Street (which I have just discussed).

6.11 Furthermore, the advice note under Condition 72 further refers to the relevant Annexes of NZS6803:1999.

Construction noise limit tables and associated advice notes

6.12 Similar to condition 72, Condition 74 provides additional detail which is essentially a reproduction of information contained within the standard.

Vibration limit tables and associated advice notes

6.13 In addition to providing detail which is essentially a reproduction of information contained within the DIN 4150 standard, condition 75 only reproduces Table 1 "Guideline values for vibration velocity to be used when evaluating the effects of short-term vibration on structures" from the standard.

6.14 As the name implies Table 1 is applicable to short-term vibration.

6.15 Construction activities which are typically considered to create short-term vibration include blasting, hammer piling and dynamic compaction.

6.16 Condition 75 makes no reference to Table 3 of DIN 4150 "Guideline values for vibration velocity to be used when evaluating the effects of long-term vibration on structures".

6.17 The limits of Table 3 are more stringent. Construction activities which are typically considered to generate long-term vibration include vibrated case piling, sheet piling and excavator movements. Therefore the conditions should refer to Table 3.

7. CONSIDERATION OF SUBMISSIONS

7.1 I have reviewed the submissions and note that 6 out of 28 submissions received pertain to construction noise and vibration.

7.2 The submissions relating to construction noise and vibration are from the residents of 238 and 240 Victoria Street, and the proprietor of the commercial operation (Madam Woo's) at 6 Sapper Moore-Jones Place.

7.3 The submissions are relatively similar and broadly the submissions consider that:

- a) The Acoustic report submitted with the application does not adequately assess construction noise and vibration;
- b) There is uncertainty on the potential damage from vibration;
- c) Ambiguity around construction duration and hours;
- d) A CNVMP be developed; and
- e) A survey of existing building condition is conducted at 238 and 240 Victoria Street prior to construction commencing.

7.4 I consider that all of the above topics are adequately addressed by the proposed conditions.

8. PROPOSED CONDITIONS OF CONSENT

8.1 The following proposed conditions succinctly provide the same degree of detail and certainty as those provided by Mr McGregor and accepted in the Council Staff Report.

8.2 To address Mr McGregor's desire for an increase in CNVMP processing time, and to specifically identify 238 and 240 Victoria Street in the conditions, I recommend the following conditions of consent (in lieu of Conditions 71 -76 of the Council Staff Report)

- 71. Construction works shall be measured and assessed in accordance with the provisions of NZS 6803:1999, and comply, as far as practicable, with the relevant noise levels stated in NZS6803: 1999, section 7.2 'Recommended numerical limits for construction noise'

72. Construction vibration shall comply with the limits in Table 1 and Table 3 of DIN 4150-3:1999 “*Structural vibration – Part 3: Effects of vibration on structures*”.
73. At least 10 days prior to Commencement of Construction, the Consent Holder shall prepare a Construction Noise and Vibration Management Plan (“CNVMP”) and submit it to the Council (Team Leader Compliance Monitoring) for certification that the CNVMP gives effect to the objectives and complies with the requirements in Conditions 71 and 72.
74. The objectives of the CNVMP are:
- a) Identify and adopt the Best Practicable Option for the management of construction noise and vibration;
 - b) Define the procedures to be followed when construction activities cannot meet the noise and vibration standards in Conditions 34 and 35;
 - c) Inform the duration, frequency and timing of works to manage disruption; and
 - d) Require engagement with affected receivers and timely management of complaints.
75. The CNVMP shall include:
- a) The relevant measures from NZS 6803:1999 “Acoustics - Construction Noise”, Annex E2 “Noise management plans”;
 - b) The relevant measures from DIN 4150-3:1999 “Structural vibration - Part 3 Effects of vibration on structures”, Appendix B “Measures for limiting the effects of vibration”
 - c) The residential apartments at 238 and 240 Victoria Street
76. All construction works shall be carried out in accordance with the certified CNVMP

James Robert Hugh Bell-Booth

1 October 2019