

BEFORE THE HEARING PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of a Notice of Requirement to alter a designation for the
HCC Central City Reservoir – Ruakiwi Road

**STATEMENT OF EVIDENCE OF MATHEW JOHN COTTLE ON BEHALF OF
HAMILTON CITY COUNCIL AS REQUIRING AUTHORITY**

(Acoustics)

Dated 19 December 2025

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INTRODUCTION

1. My full name is Mathew John Cottle.
2. I am an Associate at Marshall Day Acoustics (**MDA**). I hold a Master of Design Science degree from the University of Sydney, New South Wales, Australia. I am a current Member of the Acoustical Society of New Zealand and the Resource Management Law Association.
3. For more than 18 years I have worked in the field of acoustics, noise and vibration measurement and control in both New Zealand and Australia.
4. My New Zealand acoustic consulting experience includes:
 - a) The measurement, prediction, modelling and assessment of noise and vibration for numerous municipal drinking water and wastewater infrastructure projects; and
 - b) Preparation of many construction noise and vibration management plans; and
 - c) Analysis of acoustic issues, mitigation and management measure recommendations, and peer review work; and
 - d) Attending council and Environment Court hearings.
5. I provide this evidence on behalf of Hamilton City Council (**HCC**) as the Requiring Authority (**RA**) which has issued the Notice of Requirement (**NOR**) for the Central City Reservoir – Ruakiwi Road (**Project**). My involvement in the Project commenced in November 2024. I am the main author of the Assessment of Acoustic Effects (**AAE**) submitted with the NOR.

6. I have read the Council Officer's report prepared by Ms Galt, Senior Planner for the Urban and Spatial Planning Unit, HCC and the associated acoustic peer review memorandum (**peer review**) prepared by Mr McGregor, Environmental Health Manager, HCC. I am also familiar with the acoustic matters that have been raised in submissions.

CODE OF CONDUCT

7. I am familiar with the Code of Conduct for Expert Witnesses (Environment Court Practice Note 2023) and although I note this is a Council hearing, I agree to comply with this code. The evidence I will present is within my area of expertise, except where I state that I am relying on information provided by another party. I have not knowingly omitted facts or information that might alter or detract from opinions I express.

SCOPE OF EVIDENCE

8. My evidence addresses the following matters. It:
 - a) Describes the existing environment including identification of potentially sensitive receivers;
 - b) Summarises the guiding acoustic performance standards contained in the Hamilton City Operative District Plan (**District Plan**). I note that these would apply if the site was not designated.
 - c) Summarises my assessment of construction noise and vibration effects;
 - d) Responds to acoustic matters raised in submissions;
 - e) Responds to acoustic matters in the Council Officer's report;

- f) Comments on the proposed noise and vibration conditions, including any changes to those conditions that I recommend; and
- g) Draws a conclusion regarding acoustic effects.

EXECUTIVE SUMMARY

- 9. Reservoir operational noise and vibration effects will be negligible.
- 10. Construction noise and vibration will generally comply with the limits in NZS 6803:1999 (the construction noise standard) and DIN 4150-3:1999 (the vibration performance standard) apart from exceedances of NZS 6803:1999 as noted in my evidence.
- 11. Exceedances during construction do sometimes occur in my experience. However, where they are minimised as far as possible and any exceedances managed using a Construction Noise and Vibration Management plan (**CNVMP**) (as is proposed here) residual effects are typically acceptable.
- 12. Matters of concern raised in submissions that I address in my evidence relate to construction noise in excess of NZS 6803:1999 limits; vibration causing structural damage to dwellings; construction noise and vibration causing negative impacts on local residents, visitors and dog walkers; the understatement of construction noise and vibration effects; and noise from early morning concrete pours and associated truck movements on Ruakiwi Road.
- 13. I consider all submitter concerns are addressed through the proposed noise and vibration conditions, including most of the amendments proposed by Mr McGregor.

14. I am of the opinion that the Project's noise and vibration effects can be managed to an acceptable level through the imposition of the proposed conditions agreed with Ms Galt and Mr McGregor.

ANALYSIS

15. The following sections summarise the conclusions I have reached with respect to construction noise and vibration effects.

Construction Noise Effects

16. Construction activities on large infrastructure worksites such as this will generate a wide range of noise levels across the 24 to 30-month construction programme. In other words, there will be noisier days and there will be quieter days, and this will be largely driven by the construction programme.
17. In the AAE, I predicted worst-case noise (and vibration) levels so as to assess the outer envelope of effects. In reality, these events will occur for only a relatively small portion of the overall construction programme.
18. The guideline noise performance standards in the District Plan refer to New Zealand Standard NZS 6803: 1999 *Acoustics – Construction Noise*. I predicted short-term noise exceedances of District Plan Rule 25.8.3.2¹ (and therefore NZS 6803:1999) for the following construction activities:
- a) Up to 82 dB L_{Aeq} from vibratory sheet piling²;
 - b) Up to 78 dB L_{Aeq} from discharge main directional drilling³;

¹ In essence, the relevant noise limits Monday to Saturday between 7.30am and 6pm are 70 dB L_{Aeq} and 85 dB L_{AFmax}

² AAE Table 5 predicts exceedances of 8 to 12 dB at four receiver groups during site enabling works (retaining wall construction). Estimated duration of these works is 10-15 days.

³ AAE Table 7 predicts exceedances of 5 to 8 dB at three receiver groups on Clarence Road

- c) Up to 61 dB L_{Aeq} during early morning concrete pours⁴; and
 - d) Up to 72 dB L_{Aeq} from plate compactor use during finishing works⁵.
19. These exceedance events will occur at different points in the construction programme and for differing lengths of time. I note that the occasional exceedance of noise limits can still occur from time-to-time in my experience, even on well-managed worksites. The important point is that the occurrence of these exceedances can be practicably reduced through the preparation and implementation of an effective CNVMP.
20. The development, certification and implementation of a CNVMP forms a condition of this designation. With this plan in place I am of the opinion that construction noise effects will be practicably controlled.

Construction Vibration Effects

21. As for noise, construction vibration generated by the site will vary. A critical difference, however, is that acoustic energy in the ground does not propagate as far as it does through the air. Therefore, the vibration envelope from the Project's construction will be inherently more constrained compared to the noise envelope.
22. The guideline vibration performance standard in the District Plan is contained in Rule 25.8.3.3. This rule requires all construction vibration to be measured, assessed and comply with limits in German Standard DIN 4150-3:1999 *Structural Vibration - Effects of Vibration on Structures*.

⁴ AAE Table 10 predicts exceedances of between 14 and 16 dB at three receiver groups during early morning concrete pours.

⁵ AAE Table 11 predicts a minor 2dB exceedance at one receiver group.

23. I note that an updated version of this standard was released in 2016. The standard, DIN 4150-3:2016 *Vibrations in buildings – Part 3: Effects on structures* essentially provides the same vibration performance standards albeit, provides more detailed guidance on the vibration measurement position.
24. Mr McGregor and I are in alignment that the 2016 version of the standard is appropriate to be applied to this Project. Therefore, proposed conditions 12 and 15(b) adopt the use of DIN 4150-3:2016 in place of DIN 4150-3:1999 that District Plan Rule 25.8.3.3 refers to.
25. The DIN 4150-3 criteria are multi-faceted, but can be generalised to not exceeding 5 mm/s PPV on the floor of any residential building of interest during ‘long-term’ duration vibration.
26. DIN 4150-3⁶ states that the serviceability of residential buildings is considered to have been reduced where ‘minor damage’ occurs.
27. Minor damage includes cracking of paint, and partitions detaching from loadbearing walls⁷. It also includes the cracking of windows.
28. In the AAE I predicted vibration levels of up to ~1m/s PPV could be received at the closest receptors. This readily complies with Rule 25.8.3.3. The comfortable compliance will ensure that construction vibration effects will be avoided.
29. Although Project vibration will readily comply, this does not mean it will be imperceptible. There may be some occasions where vibration is felt by some receptors. However, I am of the opinion that where advance notice of vibration-intensive activities is given to the closest receptors, this will

⁶ Clause 4.5 DIN 4150-3:2016.

⁷ Ibid.

remove the 'surprise element' and minimise the likelihood of complaints. The notice should include an estimate of the duration of vibration-intensive works so that receptors are informed as to how long the activity will last.

SUBMISSIONS

30. Two submissions raise concerns regarding acoustic matters, one from Mr Needham and one from Ms Morrissey. Below, I will address:
- a) Construction noise in excess of the construction noise limits⁸;
 - b) Piling vibration and the risk of structural damage to dwellings⁹;
 - c) Concerns the construction phase will generate noise and vibration which will negatively impact local residents, visitors and dog walkers¹⁰;
 - d) A perception that construction noise and vibration effects have been understated, given the anticipated 30-month construction phase¹¹; and
 - e) Potential adverse effects from early morning concrete pours and truck movements on Ruakiwi Road¹².

Construction noise in excess of the construction noise limits

31. As set out in the AAE and summarised in paragraph 19 of my evidence, I have identified the activities which will generate high and possibly non-

⁸ Submission 1: by Ernest Ross Needham, 1/17 Ruakiwi Road, Hamilton Lake.

⁹ Ibid.

¹⁰ Submission 5: by Glenda Morrissey, 4/17 Ruakiwi Road, Hamilton Lake.

¹¹ Ibid.

¹² Ibid.

compliant levels of noise at Mr Needham's and other dwellings. These activities will be the focus of the required CNVMP.

32. The CNVMP will:
- a) Identify potentially affected receptors including Mr Needham;
 - b) Direct the Contractor to engage / communicate with each receptor including Mr Needham;
 - c) Consider best practicable options for noise mitigation;
 - d) Consider scheduling of activities to minimise effects;
 - e) Consider alternative construction methods; and
 - f) Detail the procedure for handling / resolving noise complaints.
33. I am of the opinion that with the CNVMP in place, Mr Needham's concern about construction noise will be adequately addressed.

Piling vibration and the risk of structural damage to dwellings

34. In paragraph 29 I set out that the Project will generate construction vibration no greater than ~1 mm/s PPV as a worst-case. This readily complies with District Plan Rule 25.8.3.3. Further, this level of vibration will not occur all of the time rather, it will have a finite duration and only potentially arise during plate compaction or vibratory sheet piling.
35. Given the ready compliance, I confirm that there will be a low risk of cosmetic damage to Mr Needham's home. For structural damage to occur,

vibration at least one order of magnitude higher than the levels I have predicted would need to occur. This simply will not happen on this Project.

36. I understand that proposed condition 16(k) requires pre and post construction building condition surveys to be undertaken on 1/17 Ruakiwi Road (Mr Needham's home) and 4/17 Ruakiwi Road (Ms Morrissey's home). I consider that this will adequately address Mr Needham's concern relating to construction vibration.

Negative community impacts from construction noise and vibration

37. Construction is an inherent part of the progression of society¹³. People are generally accepting of construction where it occurs for a finite period, is no louder than necessary, occurs during appropriate hours of the day, and where they are kept informed of its progress.
38. To address these areas, the Project will:
- a) Be restricted to daytime hours Monday to Saturday (the exceptions being those activities listed in condition 13);
 - b) Include 2.4m high barriers to reduce noise;
 - c) Be managed using a CNVMP; and
 - d) Keep the community updated via regular web page posts on HCC's or the main contractor's website.
39. In addition, Hamilton Lake Domain is a large open space reserve which enables visitors and dog walkers to choose where they wish to walk / visit.

¹³ NZS 6803:1999 foreword.

This means they have the choice to avoid the worksite and its associated temporary noise.

Perceived understatement in NOR of noise and vibration effects

40. The NOR is correct in stating that operational noise and vibration effects will be negligible¹⁴. This is on the basis that reservoirs do not typically need large pumps or plant rooms to operate therefore noise and vibration emissions will be low.
41. I am of the opinion that the AAE and the NOR were transparent in stating the Project's noise and vibration effects. As I note in paragraph 17, the Project will generate a wide range of noise (and vibration) levels across the estimated 24 to 30-month construction period. The AAE identifies the specific work activities with the potential to generate high noise (and vibration to a lesser extent) and these will be the focus of the required CNVMP.

Noise from early morning concrete pours / truck movements on road

42. I assessed noise from early morning concrete pours in the AAE¹⁵. I concluded that noise has the potential to exceed the applicable 45 dB L_{Aeq} limit thereby requiring further mitigation / management using the CNVMP.
43. I note that concrete pours will occur behind a proposed 2.4m high site noise barrier. However, additional mitigation will still be required to avoid adverse noise effects. Relevant measures include the following:
 - a) Enclosing the concrete pump(s) in an acoustic enclosure (if free-standing pumps used rather than truck-mounted);

¹⁴ NOR page 29 Section 10.5.

¹⁵ AAE page 14 Section 4.1.6.

- b) Locating the concrete pumps (concrete trucks) as far from Ruakiwi Road as practicable;
 - c) Communicate with nearby residents prior to the concrete pour, outlining the duration of the pour and expected noise levels;
 - d) Avoid multiple concrete trucks queuing to enter the site;
 - e) Observe good worksite practices of avoiding unnecessary noise such as yelling, loud radios etc; and
 - f) Avoid the use of tonal reverse alarms on trucks and the sounding of truck horns.
44. With the above measures in place in the CNVMP early morning concrete pour noise will be acceptably controlled in my opinion.
45. The District Plan does not contain noise rules for vehicles using local roads. Furthermore, the limits in NZS 6803:1999 relate to the control of noise emanating from construction sites. Therefore, the assessment of construction vehicle noise operating on public roads is a grey area. Nonetheless, I have predicted noise from Project concrete trucks travelling along Ruakiwi Road for the submitters and other receptors I identified in the AAE. I used the following inputs:
- a) Trucks moving at up to 40 km/h;
 - b) Trucks travelling in both directions on Ruakiwi Road;
 - c) Up to 12 trucks visiting the site per hour;

- d) Truck source sound power level of 108 dB L_{WA} ¹⁶;
- e) Assumes a 15 dB sound reduction through ajar windows; and
- f) Assumes a 25 dB sound reduction through closed windows.

46. The results are presented in Table 1.

Table 1: Noise from concrete trucks on Ruakiwi Road (dB $L_{Aeq(15-mins)}$)

ID	Address	External Noise Level	Internal Noise: Window Open	Internal Noise: Window Closed
R1	17 Ruakiwi Road (4 units)	54 to 61	39 to 46	29 to 36
R2	19 Ruakiwi Road (17 units)	43 to 61	28 to 46	18 to 36
R3	16 Ruakiwi Road	53 to 58	38 to 43	28 to 33
R4	14 Ruakiwi Road (12 units)	50 to 61	35 to 46	25 to 36
R5	145/145A Clarence Street	49 to 50	34 to 35	24 to 25

47. The results show that:

- a) Up to 61 dB $L_{Aeq(15-mins)}$ could occur on the façades of the closest dwellings;
- b) Internal noise of up to 46 dB $L_{Aeq(15-mins)}$ could occur where windows are left ajar; and
- c) Internal noise of up to 36 dB $L_{Aeq(15-mins)}$ could occur where windows are closed.

48. I consider that a level of 36 dB $L_{Aeq(15-mins)}$ inside a bedroom will not cause sleep disturbance effects for the following reasons:

- a) This is a low level of sound;

¹⁶ Table C4.20 from British Standard BS 5228-1:2009 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*.

- b) It will only occur for 1-2 days each pour; and
- c) Where residents are communicated with in advance that there will be more trucks on the road in the early morning on specific days, this will remove the 'surprise element' of the activity.

COUNCIL OFFICER'S REPORT

49. HCC's reporting planner, Ms Galt, relies on the advice given by Mr McGregor, who performed the peer review of the AAE. The conclusions he reaches are detailed in his memorandum¹⁷ appended to the Council Officer's report.

50. Mr McGregor notes that:

...the MDA report provides a good analysis of the effects of the works on construction and operational noise and vibration matters...I largely agree with and adopt the analysis for the purposes of this memorandum.¹⁸

51. Mr McGregor concludes that:

...the proposed works for which designation is sought...can be managed by appropriate designation conditions, including the new or modified conditions that I recommend, or similar conditions, will have adverse effects that are no more than minor and comply with the relevant statutory requirements...¹⁹.

52. I discuss Mr McGregor's proposed amendments to the noise and vibration conditions in the following section of my evidence.

¹⁷ Appendix C Specialist's Assessment Construction and Operational Noise and Vibration (27.11.25).

¹⁸ Paragraphs 11 and 12.

¹⁹ Paragraphs 42 and 43.

PROPOSED DESIGNATION CONDITIONS

53. I have reviewed the draft noise and vibration conditions proposed by the Council Officer and the amendments recommended in Mr McGregor's peer review.
54. I generally agree with the proposed suite of conditions, subject to minor updates for editorial reasons, and apart from the aspects I discuss below.

Condition 13

55. In paragraph 44 of Mr McGregor's peer review he recommends that condition 13 be amended to exclude construction work on Saturdays.
56. I disagree with this recommendation. I note that NZS 6803:1999 makes no distinction between weekdays and Saturdays between 7.30am and 6pm with respect to noise limits. Furthermore, to exclude Saturday construction would unnecessarily extend the length of the Project, meaning residents would experience construction effects for longer.
57. I understand that Mr McGregor has now agreed to Saturday construction between the hours of 7:30am to 2.30pm. I support this and note that this is now reflected in proposed condition 13.

Condition 15

58. Mr McGregor recommends condition 15 be amended to make it clear that a "suitably qualified and experienced person" should instead refer to a "suitably qualified and experienced acoustic consultant".
59. I agree with this recommendation and note that this is now reflected in proposed condition 15.

Condition 16

60. Mr McGregor recommends that condition 16 be amended to include two additional matters to be addressed in the CNVMP. The amendments relate to:
- a) Including the occurrence times and days for the specific activities listed in Condition 13(a) to (g); and
 - b) Adding the requirement to carry out pre and post construction building condition surveys on the dwellings located at 1/17 and 4/17 Ruakiwi Road.
61. I agree with Mr McGregor's recommendations and note that they are now reflected in proposed condition 16.

CONCLUSIONS AND RECOMMENDATIONS

62. Having reviewed all submissions, the Council Officer's report including the associated acoustic peer review, and Council's suite of proposed conditions as they relate to my area of expertise, I am of the opinion that the Project's noise and vibration effects can be managed to an acceptable level through the imposition of the proposed conditions agreed with the Council Officer and peer reviewer.

Mathew John Cottle

19 December 2025

APPENDIX A SENSITIVE RECEIVERS



Table 2: Receiver groups assessed in AAE

ID	Address	Zoning/usage	Min. distance to site works (m)
R1	17 Ruakiwi Road (4 units)	Residential/dwelling	33
R2	19 Ruakiwi Road (17 units)	Residential/dwelling	37
R3	16 Ruakiwi Road	Residential/dwelling	37
R4	14 Ruakiwi Road (12 units)	Residential/dwelling	40
R5	145/145A Clarence Street	Residential/dwelling	64