

IN THE MATTER

of the Resource Management Act 1991

AND

IN THE MATTER

of Hearing of Submissions and Further Submissions
on the Wellington City Proposed District Plan –
Hearing Stream 5

JOINT STATEMENT OF MECHANICAL VENTILATION EXPERTS (JWS 1)

Date of conferencing: 4 September 2023

INTRODUCTION

1. This joint witness statement relates to expert conferencing on the topic of standards for mechanical ventilation, as requested by the Panel.
2. Mechanical ventilation expert participants in the conferencing on issues 1 – 5 were:
 - Lance Jimmieson engaged by Kāinga Ora – Homes and Communities
 - Jonathan Selkirk engaged by Kāinga Ora – Homes and Communities
 - Owen Brown engaged by Wellington City Council
3. Acoustic experts in attendance as observers on issues 1 – 4 and participants on issue 5 were:
 - Malcolm Hunt engaged by Wellington City Council
 - Matthew Borich engaged by Wellington City Council
 - Stephen Chiles engaged by Waka Kotahi and KiwiRail
 - Darran Humpheson engaged by Wellington International Airport Limited
 - Jon Styles engaged by Kāinga Ora – Homes and Communities
4. Planning experts in attendance as observers were:
 - Catherine Heppelthwaite engaged by Waka Kotahi and KiwiRail
 - Kirsty O'Sullivan engaged by Wellington International Airport Limited
 - Matthew Lindenberg engaged by Kāinga Ora – Homes and Communities

5. As observers, the planning experts are not signatories of this JWS.

6. The conferencing was in person at Wellington City Council’s Boulcott Office and on-line (Microsoft Teams), facilitated by Mark Ashby as observer.
7. We confirm that we have read the Environment Court’s Code of Conduct set out in the Environment Court’s Practice Note 2023. We have complied with the Code of Conduct in preparing this joint statement. Except where we state that we are relying on the evidence of another person, this evidence is within our area of expertise. We have not omitted to consider material facts known to us that might alter or detract from the opinions expressed in this evidence.
8. The primary data on which the opinions are based is:
 - The Wellington City Proposed District Plan (PDP)¹
 - The statement of evidence of Lance Jimmieson for Kāinga Ora (2023)²
 - The statement of evidence of Malcolm Hunt on behalf of Wellington City Council (2023)³
 - The statement of supplementary evidence of Malcolm Hunt – Noise (2023)⁴
 - Section 42A report for Hearing Stream 5 relating to Noise.⁵
9. Agreements on matters covered by this statement are reflected in the drafted NOISE-S6 provision attached in Appendix 1. Due to availability constraints, it was not possible to receive input from all of the experts on the final iterations of the proposed wording of proposed NOISE-S6 2.c in Appendix 1. The position agreed to by each expert on this matter is recorded in the Issue 5 table agreed position section. Any sections of this proposed standard that are underlined in red were subject to a difference in position between experts, and this difference of position will be reflected in the “Agreed position” sections of the issue tables.

MATTERS COVERED BY THIS STATEMENT

ISSUE 1:	Separate ventilation standard for habitable rooms that meet the NZBC requirement for ventilation with windows, and for all other habitable rooms
FACTS / ASSUMPTIONS	<ol style="list-style-type: none"> 1. At present, Proposed District Plan NOISE-S6 does not provide separate minimum ventilation standards for habitable rooms that meet New Zealand Building Code (NZBC) requirement for ventilation with windows, and all other habitable rooms. 2. It was noted by Mr Selkirk that in the submission of Kāinga Ora – Homes and Communities on NOISE-S6 that where sufficient openable windows are provided, compliance with NZBC ventilation standards is required. Where there are not sufficient windows, the ventilation rate is changed to 1ACH.

¹ [Wellington City Council Proposed District Plan](#)

² [Rebuttal evidence of Mr Lance Jimmieson for Kāinga Ora – Homes and Communities \(2023\)](#)

³ [Statement of evidence of Mr Malcolm Hunt on behalf of Wellington City Council \(2023\)](#)

⁴ [Statement of supplementary evidence of Mr Malcolm Hunt on behalf of Wellington City Council \(2023\)](#)

⁵ [Section 42A Report - Noise](#)

	3. Mr Jimmieson agreed that the standard should provide for both situations where the habitable room has windows that provide the ventilation requirement under NZBC, and where the habitable room does not meet the NZBC ventilation requirement with windows.
AGREED POSITION	4. We agree that NOISE-S6 should provide separate minimum ventilation standards for habitable rooms that meet New Zealand Building Code (NZBC) requirement for ventilation with windows, and all other habitable rooms.

ISSUE 2:	Temperature control in rooms that require acoustic insulation under NOISE-S4 and NOISE-S5.
FACTS / ASSUMPTIONS	<p>5. At present, the Proposed District Plan NOISE-S6 does not include a requirement for temperature control.</p> <p>6. In responding to submissions received, Mr Brown’s recommendation (as reported in Mr Hunt’s evidence in chief) is that NOISE-S6 provide for controllable cooling and heating to maintain the inside temperature between 18°C and 25°C in a habitable room requiring acoustic insulation under NOISE-S4 or NOISE-S5.</p> <p>7. In his statement of rebuttal evidence, Mr Jimmieson agreed with Mr Hunt and Mr Brown that NOISE-S6 should require rooms to be provided with occupant-controlled heating and cooling capable of maintaining room conditions of 18°C and 25°C. Mr Jimmieson also recommended that this temperature range is achieved whilst utilising a 2.5% design weather data condition for the applicable region when calculating heating and cooling capacities required.</p> <p>8. In conferencing, both Mr Jimmieson and Mr Brown reiterated support for this requirement. Mr Brown also agreed with Mr Jimmieson’s additional point that the temperature range should be provided based upon calculations being completed using a 2.5% design weather condition for the applicable region.</p>
AGREED POSITION	9. We agree that NOISE-S6 be amended to require, for all habitable rooms required to be insulated under NOISE-S4 and NOISE-S5, provision for heating and cooling that is controllable by the occupant and can maintain the inside temperature between 18°C and 25°C when assessed using a 2.5% design weather condition for the applicable location is required.

ISSUE 3:	Requirement for a ventilation flushing function for habitable rooms that require acoustic insulation under NOISE-S4 and NOISE-S5
FACTS / ASSUMPTIONS	10. At present, the Proposed District Plan NOISE-S6 does not require a ‘flush’ function for any habitable rooms that require acoustic insulation under NOISE-S4 or NOISE-S5.

	<p>11. In response to submissions received, Mr Brown’s recommendation (as reported in Mr Hunt’s evidence in chief) is that ventilation systems required under NOISE-S6 should provide flushing capability This room flushing requirement can be reduced where the habitable rooms have windows compliant with NZBC ventilation requirements.</p> <p>12. In his statement of rebuttal evidence, Mr Jimmieson recommended that a flush function only be provided where no openable windows are provided. And that where opening windows are provided, they can be used to effectively flush rooms.</p> <p>13. In his statement of rebuttal evidence, Mr Jimmieson recommended that dwellings that have no openable windows could have a flush function, with an increased possible ventilation rate of up to 2 ACH.</p> <p>14. Mr Jimmieson also noted that dwellings with openable windows can use those windows to provide flushing capability. Noise through openable windows would be brief and inconsequential.</p> <p>15. In conferencing, Mr Jimmieson proposed that any ventilation system should operate continually. Although this may result in air quality deterioration during the night when people are home, it would clear out during the day when people are not home, achieving an acceptable overall balance across a 24-hour period. This is the preferred option due to the inability of a user to appropriately manage air quality with adjustable ventilation systems.</p> <p>16. Mr Brown considered that extract systems installed would assist with the flushing function if needed. 1 ACH would be sufficient as this effectively doubles the flow from the minimum flow as per G4/AS1.</p>
AGREED POSITION	<p>17. We agree to a requirement for 1 ACH continuous operation where a habitable room requiring acoustic insulation under NOISE-S4 or NOISE-S5 does not otherwise meet NZBC ventilation requirement with openable windows. This flush capability should not be required where the habitable room has sufficient openable windows to meet NZBC ventilation requirements.</p>

ISSUE 4:	Minimum ventilation rate required for a ventilation system where habitable rooms require acoustic insulation under NOISE-S4 and NOISE-S5.
FACTS / ASSUMPTIONS	18. At present, for a bedroom that has windows compliant with the NZBC requirements for ventilation but requires those windows to be closed to achieve NOISE-S4 and NOISE-S5, NOISE-S6 requires a minimum ventilation rate of 7.5 litres per second per person.

	<p>19. Mr Brown’s recommendation (as reported in Mr Hunt’s evidence in chief) is that NOISE-S6 require a minimum ventilation rate of 3 ACH.</p> <p>20. In his statement of rebuttal evidence, Mr Jimmieson recommended that Section 1.5 (Mechanical Ventilation) of NZBC G4/AS1 requirement of a minimum of 0.35 ACH/7.5L/s/person (whichever is greater) or CIBSE Guide A Environmental Design Table 1.5 that requires up to 1 ACH are adequate for minimum ventilation rates.</p> <p>21. Both mechanical ventilation experts agreed on lower overall ventilation rates.</p>
AGREED POSITION	<p>22. We agree to minimum ventilation rates as reflected in Appendix 1 – NOISE-S6 draft provision at 2.a and 3.b</p> <p>23. For habitable rooms with NZBC G4 compliant windows, this is the ventilation rates required under section 1.5 Mechanical Ventilation of NZBC G4/AS1.</p> <p>24. For all habitable rooms, excluding those with NZBC G4 compliant windows, an adjustable rate between that required by NZBC G4 and up to 1 ACH is recommended.</p>

ISSUE 5:	Indoor noise performance standard for ventilation systems for habitable rooms that require acoustic insulation under NOISE-S4 and NOISE-S5.
FACTS / ASSUMPTIONS	<p>25. Existing ventilation standards applying to rooms that require acoustic insulation do not include any indoor noise performance standard for the operation of the ventilation system.</p> <p>26. Both Mr Hunt, with input from Mr Brown, and Mr Jimmieson in their respective evidence agree that compliant ventilation systems should not generate noise at levels greater than 35 dB LAeq(30s) when measured 1 metre from any grille or diffuser.</p>
AGREED POSITION	<p>We agree that ventilation systems should not generate noise at levels greater than 35 dB LAeq(30s) when measured 1 metre from any grille or diffuser.</p> <p>Dr Chiles considers that noise from mechanical systems should be limited to 35 dB LAeq(30s) measured at one metre from any internal grilles and diffusers, at all times while achieving the required ventilation and temperature requirements. This noise limit would ideally be more stringent to provide better indoor conditions, but he considers this to be a pragmatic compromise allowing for practical systems. In his opinion, occupants may be adversely affected by any further allowance for increased system noise, and might then be more likely to open windows, which would undermine sound insulation requirements necessary to manage potential health effects from road and rail noise.</p>

Dr Chiles and Mr Hunt have agreed to the following wording (Position 1) of NOISE-S6 2.c:

- c. An HVAC system installed in compliance with (a) and (b) above must not generate an indoor noise level greater than 35dB LAeq (30s) when measured 1 metre from any outlet/inlet when operating at the maximum required duty, and

Mr Selkirk and Mr Styles have agreed to the following wording (Position 2) of NOISE-S6 2.c:

- c. An HVAC system installed in compliance with (a) and (b) above must not generate an indoor noise level greater than 35dB LAeq (30s) when measured 1 metre from any outlet/inlet when operating at the maximum required duty. This does not apply to initial start-up, and

The remainder of the experts have agreed to the following wording (Position 3) of NOISE-S6 2.c:

- c. An HVAC system installed in compliance with (a) and (b) above must not generate an indoor noise level greater than 35dB LAeq (30s) when measured 1 metre from any outlet/inlet when operating at the minimum required duty, and

PARTICIPANTS TO JOINT WITNESS STATEMENT

The mechanical ventilation experts confirm that we agree that the outcome(s) of the expert conferencing are as recorded in this statement. The mechanical ventilation experts conferenced on issues 1 – 5.

18 September 2023



Lance Jimmieson for
Kāinga Ora



Owen Brown
for Wellington City Council



Jonathan Selkirk for
Kāinga Ora

The acoustic experts confirm that we agree that the outcome(s) of the expert conferencing are as recorded in this statement. The acoustic insulation experts conferenced on issues 5.

18 September 2023



Darran Humpheson for
Wellington International Airport
Limited



Malcolm Hunt for
Wellington City Council



Matthew Borich for
Wellington City Council



Stephen Chiles for
KiwiRail and Waka Kotahi



Jon Styles for
Kāinga Ora

P1 Sch1	NOISE-S6	Ventilation requirements	
	All Zones	<ol style="list-style-type: none"> 1. The minimum external to internal noise reduction levels in NOISE-S4 and NOISE-S5 must be achieved at the same time as the ventilation requirements of the New Zealand Building Code. Minimum ventilation standards are set out below for habitable rooms classified into one of two possible categories as follows: <ol style="list-style-type: none"> a. Habitable rooms with ventilation provisions to meet the ventilation requirements of the New Zealand Building Code; and b. All other habitable rooms requiring to be acoustically insulated under NOISE-S4 and NOISE-S5 2. Where habitable rooms are provided with windows openable to the outside environment sufficient in area to meet the ventilation requirements of the New Zealand Building Code, and where these windows must remain closed to achieve compliance with <u>NOISE-S4</u> and <u>NOISE-S5</u> acoustic insulation standards, the room shall meet the following minimum requirements; <ol style="list-style-type: none"> a. The room is to be provided with a mechanical ventilation system compliant with section 1.5 Mechanical Ventilation of NZBC G4/AS1; and b. The room is provided with heating and cooling that is controllable by the occupant and can maintain the inside temperature between 18°C and 25°C when assessed using the NIWA 2.5% design weather condition for the applicable location. and c. An HVAC system installed in compliance with (a) and (b) above must not generate an indoor noise level greater than 35dB LAeq (30s) when measured 1 metre from any outlet/inlet <u>when operating at the maximum required duty</u>, and 3. Excluding habitable rooms qualifying under (2) above, i.e. where opening windows do not meet the ventilation requirements of the New Zealand Building Code, or are not provided, minimum ventilation system requirements for habitable rooms requiring to be acoustically insulated under <u>NOISE-S4</u> and <u>NOISE-S5</u> are set out as follows; <ol style="list-style-type: none"> a. HVAC systems shall be compliant with sections 2a-c above, and b. The mechanical ventilation system referred to in 2a above shall be able to supply outside air at an adjustable rate from the NZBC G4 minimum ventilation rate up to 1 room air change per hour. 4. Alternatively, in lieu of sections 2 and 3 above, a design verified by a suitably qualified and experienced Engineer stating the design proposed will provide ventilation and internal space temperature controls to meet or exceed the outcomes described in parts 2 and 3. 5. Ducting that is inaccessible shall be rigid, flexible ducting shall only be used where accessible. 6. Any concealed equipment shall be provided access for servicing. <p>Note: This standard applies in addition to, and does not affect the requirements of, the Building Act 2004.</p>	<p>Assessment criteria where the standard is infringed:</p> <ol style="list-style-type: none"> 1. The ability to achieve acceptable indoor ventilation and acoustic amenity; 2. Any mitigation of the proposed ventilation noise, in accordance with a best practicable option approach; 3. The ability to mitigate adverse effects through the imposition of conditions; 4. In relation to a heritage building or a contributing building within a heritage area, the extent to which it is practicable to achieve ventilation to the required standard without detracting from identified heritage values

Note – any content underlined in red was subject to a difference of position between experts. This difference in opinion will be outlined in the “Agreed position” section of the given issue.