Before the Hearings Panel
At Wellington City Council

Under Schedule 1 of the Resource Management Act 1991

In the matter of the Proposed Wellington City District Plan

Statement of evidence of Nick Locke on behalf of Wellington City Council (Wind)

Date: 26 May 2023

INTRODUCTION:

1 My full name is Nicholas John Locke. I am employed as a Principal Research Engineer at WSP New Zealand Limited, and have worked as a wind engineer for 15 years.

2 I have prepared this statement of evidence on behalf of the Wellington City Council (the **Council**) in respect of technical related matters arising from the submissions and further submissions on the Proposed Wellington City District Plan (the **PDP**).

3 Specifically, this statement of evidence relates to the matters in the Wind Chapter of Part 2 and Appendices 8 and 14 of Part 4 of the PDP.

4 I am authorised to provide this evidence on behalf of the Council.

QUALIFICATIONS AND EXPERIENCE

5 I hold the qualifications of Bachelor of Engineering (Hons) and Master of Engineering from the University of Auckland.

6 I have worked at WSP (or Works Consultancy Services limited and Opus International Consultants Limited previously) as a wind engineer for 15 years on a variety of commercial wind engineering projects and wind related research. This work has primarily focused on the aerodynamics of buildings and structures. I have also worked at MBIE (and previously DBH) as a senior advisor in the Building Code team for over 10 years where I was a member of the wind loading standards committee.

7 I am a member of Engineering New Zealand and the Australasian Wind Engineering Society.

Code of conduct

8 I have read the Code of Conduct for Expert Witnesses set out in the Environment Court's Practice Note 2014. I have complied with the Code of Conduct in preparing my evidence and will continue to comply with it while giving oral evidence. My qualifications as an expert are set out above. Except where I state I rely on the evidence of another person, I confirm that the issues addressed in this statement of evidence are within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from my expressed opinions.

SUMMARY

9 My name is Nick Locke.

10 I have been asked by the Council to provide evidence in relation the submissions received on the Wind Chapter of Part 2 the PDP.

11 My statement of evidence addresses the basis for the wind provisions and appendices in the PDP and rationale for changes from the wind provisions in the Operative District Plan (ODP).

INVOLVEMENT WITH THE PROPOSED PLAN

12 I have been involved in the PDP since 2020, providing specialist wind advice to the review the wind policies, rules, standards, appendices and best practice guidance in the operative district plan and developing the objectives, policies, rules and standards in the wind chapter and developing Appendix 8 and 14 of the PDP.

SCOPE OF EVIDENCE

13 My statement of evidence addresses the following matters:

13.1 Significant changes to wind controls in the PDP

13.2 The effect of building height on pedestrian wind conditions.

13.3 The criteria ("trigger") that define when wind effects need to be assessed.

13.4 Cost associated with planning controls for wind.

Changes to the wind controls in the PDP

14 The new wind chapter in the PDP was drafted with the intention of:

1) Reformatting the wind controls in the ODP to be consistent with the format of the second generation district plans and the National Planning Standards,

2) Maintaining a similar level of wind controls to the existing controls in the ODP, and

3) Simplifying the operation of wind controls in the planning process and improving usability.

15 The wind standards are essentially the same in the PDP and the ODP, with small changes to simplify some of the technical wind criteria. The most significant changes to wind controls in the PDP from the ODP provisions are to:

15.1 The format and layout of the rules and standards;

15.2 Increases to the building heights that trigger the assessment of wind effects;

15.3 More detailed wind guidance in Appendix 14 Wind Chapter Best Practice Guidance Document of the PDP; and

15.4 application of the wind standards to development in the tertiary education and hospital zones that are adjoining public spaces.

Tertiary Education Zone and Hospital Zone

16 In the PDP the wind standards apply to building developments in the Tertiary Education Zone and the Hospital Zone, but only where the building adjoins a public street, where wind controls could reasonably be expected to be needed to protect the public interest. Development within the tertiary education and hospital zones that does not adjoin a public street is not subject to planning controls for wind. I consider that the Wind chapter rules and standards should still apply to the Tertiary Education and Hospital Zone as per the PDP.

Wind effects of increasing building height

17 The proposed increase in the building height limits in some zones has potential to increase adverse wind conditions in pedestrian areas, particularly unsafe existing wind conditions, as higher buildings usually generate windier conditions at ground level. Residential zones where existing buildings are low and where permitted building heights have increased significantly are likely to see localised deterioration in wind conditions near large new developments.

18 A fundamental effect of increasing the heights of new buildings in areas with predominantly low building heights is that the new buildings are generally exposed to the stronger winds that blow at higher levels. This exposure can generate downwash wind flows that produce localised windy areas near the base of the new building. In windy and exposed locations, relatively low buildings, 4-6 stories in height, can produce dangerous wind speeds. As the height of buildings exposed to wind increases, the likelihood of dangerous wind speeds also increases.

19 The change in height limits in the PDP is therefore likely to put more pressure on consent planners to ensure the wind effects are managed appropriately. As such it is important that the wind rules apply to HRZ to mitigate adverse wind effects from tall buildings.

Trigger heights in the PDP

20 The wind controls in the ODP and PDP are triggered when a development exceeds a threshold height. Buildings height is a relatively simple trigger for deciding when wind effects of a development must be reported, which makes it easy to interpret and implement, and gives certainty about when wind controls apply. However, the simplicity of the trigger also means that some relatively low buildings that generate adverse wind effects will not be considered, and some taller buildings that have little impact on the wind will need to be assessed.

21 It is important to recognise that the trigger height for the wind standards does not correspond to compliance – some buildings below the trigger height (which are not assessed) would not comply with the wind standards, while other buildings which exceed the trigger height are shown to comply. Generally, buildings that exceed the trigger height do not fully comply with the wind rules, and some planning discretion is required to balance the benefits of development against the residual non-compliance.

22 The trigger heights in the ODP range between 9m and 18.6m (depending on the zone) and have been increased in the PDP to 12m to 20 m. Through the reccomendations in the S42A, the trigger heights have increased further to 15m for a qualitative assessment requirement and to a trigger of 25m for a quantitative wind report requirement. The proposed height triggers in the PDP and the S42A officer's reccomendations reflect the higher building heights that are sought in many of the zones in the PDP, and were selected at the upper bound of the ODP to ensure the PDP did not impose a greater compliance burden than the ODP. An overall increase in existing

building heights in some parts of Wellington also support increases in the trigger height, as buildings receive more shelter from their neighbours and therefore tend to have less impact on pedestrian wind conditions.

23 The building height that triggers wind standards in other cities provides some indication of when it is sensible to manage the wind effects of new buildings. However, it is important to compare wind rules for cities with a similar wind climate and with similar heights of existing buildings, as both the prevailing winds and the general exposure of new buildings to those winds will have a significant bearing on trigger thresholds. For comparison, in Auckland the trigger height for assessing wind effects is 25m, while Lower Hutt uses 12m to trigger reporting requirements in relevant zones (wind controls do not apply to every zone in either city).

24 The proposed height thresholds for triggering wind assessments and wind studies have ended up being relatively high for Wellington's wind climate. This will allow development to proceed with minimal reporting costs whilst still controlling most development with large adverse wind effects. The overall effect on pedestrian wind speeds of increasing the height of an isolated building from 18.6m to 20m is estimated to be a 2% increase, while an increase in height from 18.6m to 25m is estimated to increase wind speeds by 10%. On this basis, the trigger height of 20m for a qualitative assessment in the city centre zone is a useful mechanism to ensure buildings that are less than 25m in height (ie the trigger for quantitative studies) are still assessed for adverse wind effects.

Costs of assessing wind effects

25 The increased trigger heights in the PDP are expected to produce savings by (1) avoiding wind assessments of buildings that are unlikely to have a large impact on the wind environment, and (2) reducing the number of developments that need to have quantitative studies done

to show compliance with the wind standards. Typical costs associated with wind controls are outlined below.

25.1 A qualitative assessment (ie expert opinion / desktop study) would generally take one or two days to prepare, depending on the scale and complexity of the building/s, and would cost approximately $3,000 to $6,000.

25.2 A quantitative wind study involves wind tunnel testing a physical scale model of the development and measuring wind speeds with and without the proposed building. These investigations generally take a few weeks to complete and cost around $20,000 to $35,000, depending on the size and complexity of the development and surrounding area.

25.3 *Redesign* Costs associated with delays, and fees for redesigning buildings that do not comply with wind standards, are difficult to predict as these costs are highly dependent on the specific development and on the effort that is put into the original design to minimise wind effects.

25.4 *Peer review* Peer reviews of wind assessments (qualitative or quantitative), often initiated by Councils, are likely to have similar or lower costs than a qualitative assessment. The quality of the information received by the reviewer will determine the time and costs of a review.

25.5 *Resource consent process* The delays and processing costs associated with the wind controls can be significant if wind effects are particularly severe or if the application is of a poor quality. These costs are highly specific to projects.

25.6 *Hearings* Costs associated with Resource Consent and Environment Court hearings are difficult to predict, as these costs are highly dependent on the specific

development and on the degree of public submissions in opposition.

26 The effectiveness of the wind controls has been, and will be, dependant on how well the wind rules and standards are applied, and how well planning discretion is used to resolve conflicting planning requirements (for example, providing wind shelter to a footpath while maintaining access for pedestrians). The technical wind standards and the associated rules do not guarantee good wind outcomes, but do provide a necessary starting point for this planning consideration.

Date: 26/05/2023

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