BEFORE THE INDEPENDENT HEARINGS PANEL
OF AUCKLAND COUNCIL

I MUA NGĀ KAIKŌMIHANA MOTUHAKA
I TE TĀMAKI MAKAURAU ROHE

UNDER	the Resource Management Act 1991 ("**RMA**")
AND	
IN THE MATTER	of an application to Auckland Council by Watercare Services Limited ("**Watercare**") for a resource consent to construct, commission, operate and maintain a wastewater tunnel and associated activities in Herne Bay, Auckland ("**Project**")

STATEMENT OF EVIDENCE OF ANDREW NATHAN CLARKE ON BEHALF OF WATERCARE SERVICES LIMITED

(STRUCTURAL ENGINEERING)

2 FEBRUARY 2024

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1. SUMMARY OF EVIDENCE

1.1 My full name is Andrew Clarke and I am a structural engineer and the Managing Director at Mitchell Vranjes Consulting Engineers.

1.2 I have been engaged by Watercare to assess the potential impact on the structural integrity of the townhouses at 92 Sarsfield Street, 94 Sarsfield Street, 96 Sarsfield Street, 98 Sarsfield Street, and 51 Wallace Street (1930s two-storey terraced housing) ("**Townhouses**") from the construction of Watercare's proposed wastewater tunnel in Herne Bay ("**Project**").

1.3 To assess the potential impact on the Townhouses from the construction of the Project, I have undertaken a site inspection and considered how the predicted settlement/vibration effects and the proposed methodology of construction works could affect the structure and existing alterations. In forming my view and in drafting this evidence, I have relied on the settlement, hydrology, noise and vibration modelling and predictions undertaken by Tonkin & Taylor ("**T+T**") for the Project.

1.4 In my opinion, the predicted settlement, hydrology, noise and vibration values at the property will not affect the structural stability of the building/Townhouses.

1.5 There is the potential for cosmetic damage to the Townhouses to result from predicted settlement, such as the propagation of existing cracks and/or formation of new cracks. However, such cosmetic damage (should it occur) can be easily remediated. Watercare is offering pre and post condition surveys to the owners of the Townhouses so as to identify any cosmetic damage that may occur to the Townhouses resulting from the construction of the Project and will undertake any necessary remediation. I support this approach and note that it is standard for large-scale infrastructure construction projects of this nature.

Qualifications and Experience

1.6 My full name is Andrew Clarke. I am the Managing Director at Mitchell Vranjes Consulting Engineers and have held this position since February 2019.

1.7 I have the qualification of Bachelors in Engineering (Hons), am a Chartered Professional Engineer and a Chartered Member of Engineering NZ.

1.8 I joined Mitchell Vranjes in 2007 where I have worked in various roles as a structural engineer for the last 17 years. I have been involved in the assessment and strengthening of numerous unreinforced masonry buildings including Monte Cecelia House over my time at Mitchell Vranjes.

Involvement in the Herne Bay Tunnel Project

1.9 I have been engaged by Watercare to undertake a specific assessment of any potential effects from a structural engineering perspective to the properties located at 92 Sarsfield Street, 94 Sarsfield Street, 96 Sarsfield Street, 98 Sarsfield Street and 51 Wallace Street (Townhouses) resulting from construction of the Project. The Project involves the construction and operation of a wastewater transfer pipeline, in Herne Bay, Auckland, which will connect to the Central Interceptor in Point Erin Park.

Code of conduct

1.10 I confirm that I have read the Code of Conduct for Expert Witnesses contained in the latest Environment Court Practice Note 2023 and that I agree to comply with it. I confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express, and that this evidence is within my area of expertise, except where I state that I am relying on the evidence of another person.

2. SCOPE OF EVIDENCE

2.1 This statement of evidence will:

(a) Provide an explanation of the methodology adopted to assess the potential for any effects to result from construction of the Project on the Townhouses; and

(b) Summarise the structural characteristics of the Townhouses and the potential for any damage to occur as a result of those structural characteristics and construction of the Project.

3. METHODOLOGY FOR ASSESSMENT

3.1 The structural assessment of the properties involved reviewing the property file obtained from Auckland Council and conducting a site inspection on 16 January 2024 to determine the building construction type and current structural condition.

3.2 The site inspection included an internal and external visual inspection of each Townhouse. The subfloor was also inspected at 94 Sarsfield Street and 98 Sarsfield Street. 92 Sarsfield Street has a foundation slab on grade (no subfloor). The subfloor at 96 Sarsfield Street and 51 Wallace Street was not inspected as there were no concerns at the other properties and it was difficult to access. Floor levels were checked locally using a simple 80cm long spirit level in the along and across direction on ground and first floor levels. Obvious cracks in external and internal walls at each Townhouse have been identified and recorded with structural effects assessed. This has been presented in a condition report for each townhouse and will be made available to the owners.

3.3 I have assessed the structural integrity of the Townhouses based on the expected hydrology, settlement, noise and vibration effects of this Project undertaken by T+T and detailed in Herne Bay Connector Project – Groundwater and Settlement Assessment Report v4.0 ("**Groundwater Assessment**"), and Herne Bay Tunnel – Construction noise and vibration technical assessment v1.0 ("**CNV Assessment**") respectively. I have also reviewed and rely upon the evidence of Ms Yung and Mr Thomas who address the potential vibration and settlement effects respectively. My assessment takes into account the observed cracks at the Townhouses which, in my opinion, do not affect the Townhouses' current structural performance or their ability to resist the potential construction related effects of the Watercare tunnel.

3.4 I note in terms of disclaimers and exclusions for my assessment:

(a) The visual inspection and findings are focused on structural elements only. The conditions of non-structural elements have not been included in my assessment.

(b) Services and utilities (above or below ground) were not inspected and are not commented on.

(c) For safety reasons and because it will only have a minor impact on the structural integrity, we did not inspect the roof and this has not been commented on. Buildings of this era and style were generally constructed very similarly, enabling us to make some reasonable assumptions based on inspections of similar buildings.

4. STRUCTURAL CHARACTERISTICS

4.1 The Townhouses form a single building which is a two-storey terraced house consisting of five units constructed in the 1930s. The external and intertenancy walls are plastered double skin unreinforced masonry ("**URM**"). The external walls have a cavity between the two URM skins. The floors and walls within each unit are timber.

4.2 URM buildings are brittle/rigid in nature compared to modern framed buildings. Hence, generally are more susceptible to cosmetic cracking when subjected to the settlements and vibrations outlined in T+T's Groundwater Assessment and CNV Assessment. Structural damage at the levels mentioned is highly unlikely.

4.3 Floor levels at each Townhouse are within normal construction tolerances for a building of this age. A slight floor slope toward the road was generally observed in the bedrooms on the upper floor for all the Townhouses.

4.4 A number of existing cracks were observed during the site inspection, however none affected the structural integrity of the Townhouses. I believe these cracks are a result of the following factors as outlined below. It is worth noting that the properties that have been renovated in recent years 92, 94, 96 Sarsfield Street) have less observable cracks than those which have not been renovated (98 Sarsfield Street & 51 Wallace Street). This is likely because they were repaired during renovations and have not cracked again since. I have included a sample of the cracking observed during the site inspection with my evidence at **Attachment 1**. These show:

(a) Cracking around windows (Photo 1). Likely caused by historic shrinkage or seasonal expansion/contraction in URM walls.

(b) Cracking observed at interface/joints between URM and timber walls (Photo 2). Likely caused by differential movement between the different construction materials.

(c) Cracking observed in or between landscaping URM walls (Photo 3). Likely caused by seasonal expansion/contraction of the ground and with potentially shallower foundations than the main building.

4.5 Property file information, documents, and correspondence between parties indicate various alterations and additions have occurred to the Townhouses throughout its lifetime. Documents of structural significance include the following:

(a) Construction of four garages on the eastern end of the property.

(b) 92 Sarsfield Street – Interior renovation (including bathroom, kitchen, and laundry). Construction of pergola and bridge to residence above garages.

(c) 94 Sarsfield Street – Interior renovation. Alteration of backyard door size and location with the addition of a steel portal with replacement of joinery.

5. ASSESSMENT OF POTENTIAL EFFECTS

5.1 T+T estimate the Townhouses will experience settlements in the range of 5mm - 10mm[1] due to the construction of the shaft and tunnel in the vicinity of the Townhouses.

5.2 T+T estimate the Townhouses will experience peak vibration levels below the DIN 4510-3 limits for structural damage to residential buildings.[2]

5.3 Taking into consideration the characteristics of the Townhouses observed during the site visit, and from what I understand from reviewing the property file, I do not consider the settlement or vibration estimates provided by T+T will have any impact on the structural stability of the building. However, I do consider there to be the potential for existing cosmetic cracks to widen and new cosmetic cracks to form from predicted settlements.

5.4 Cosmetic cracking of this nature can be easily remediated. If required, small cracks can be plastered and painted, while larger cracks may also require grout injection. [1]Further, I note that Watercare is offering pre and post condition surveys to the owners of the Townhouses. I support this approach as it will ensure any cosmetic damage is identified and will also enable easy remediation to occur should that be required.

6. SECTION 42A REPORT

6.1 I have reviewed the section 42A report insofar as it relates to the potential adverse effects from construction of the Project on the Townhouses. Although the s42A report does not address whether the characteristics of the

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1 Tonkin & Taylor Ltd. (2023) Herne Bay Connector Project – Groundwater and Settlement Assessment Report V4.0, Section 8 – Table 8.3, Table 8.4

2 Tonkin & Taylor Ltd. (2023) Herne Bay Tunnel – Construction noise and vibration technical assessment v1.0, Appendix C, Table 1, Appendix E

Townhouses make them more susceptible to damage from vibration and settlement effects, I agree with the conclusions that any potential damage will be negligible to very slight.

7. CONCLUSION

7.1 Based on reviewed information, I believe the potential settlement and vibration resulting from construction of the Project will not affect the structural stability the Townhouses. There is the potential for construction activities to cause cosmetic damage in the form of cracking as I have outlined above, which can be easily remediated.

Andrew Clarke
2 February 2024

Attachment 1 – Examples of existing cracks on the property

Photo 1 - Example of cracking around windows

Photo 2 - Example of cracking at interface between URM and timber walls

Photo 3 - Example of cracking in landscaping URM walls