

**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

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**STATEMENT OF EVIDENCE OF CHRISTOPHER PETER LENSSEN ON BEHALF OF  
HAMILTON CITY COUNCIL AS REQUIRING AUTHORITY**

**(Structural Engineering)**

**19 December 2025**

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## **INTRODUCTION**

1. My full name is Christopher Peter Lenssen
2. I have a Bachelor of Engineering Degree and am a Chartered Professional Engineer with 15 years designing experience, the majority of which is with water retaining structures. I work for Holmes NZ LP.
3. 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**). I am the Structural Engineer for the reservoir and valve chamber on the Project. I prepared the structural design drawings in Appendix B to the NOR.

## **CODE OF CONDUCT**

4. 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**

5. My evidence will cover the structural design of the Project, including the reservoir structure and valve chamber building.

## **EXECUTIVE SUMMARY**

6. Following a Multi Criteria Analysis (**MCA**), the structural form of a pre-stressed and post-tensioned concrete, circular reservoir structure was selected as the best structural form for this site and its conditions.

7. One submission from Mr Ernest Needham raises concern about vibrations from construction having an adverse effect on the structural integrity of his residence. I confirm that no piling is required for the construction of the reservoir or valve chamber so vibrations will be minimal. Installing sheet piling to allow for temporary construction access will be the only operation that will cause vibration. I note that Mr Cottle responds to this submission point in his evidence and confirms that there will be a low risk of cosmetic damage to Mr Needham's home.
8. No submissions raised any other matters with respect to the structural engineering of the reservoirs or the valve chamber.
9. Based on comments made by Mr Edmonds who peer reviewed the NOR from a structural engineering perspective, I recommend that some matters be incorporated at detailed design. Otherwise, I do not recommend any changes to the proposed designation conditions.

## **ANALYSIS**

### **Summary of Technical Design**

10. Following a MCA, the structural form of a pre-stressed and post-tensioned concrete, circular reservoir structure was selected as the best design for this site and its conditions.
11. The geometry of the tank required for the 25 megalitres of storage was selected to be 62m diameter with 8.65m depth of water storage. The top of the reservoir floor will be at RL = 61.0m and the roof of the reservoir (at the wall location) will be at RL = 71.0m. The existing ground is at RL = 64.0 at the top of the site and the reservoir will therefore be cut into the bank and backfilled. At the low side of the site, the ground will need to be raised to provide the bearing platform for the reservoir.

12. The reservoir and valve chamber will be designed with a 100 year design life and as an Importance Level 4 (**IL4**) structure. IL4 design is used for construction which has "*High consequence for loss of human life, or very great economic, social or environmental consequence*". IL4 is typically reserved for hospitals and major infrastructure and is only exceeded by IL5 which is "*exceptional circumstances*" (and its use is extremely rare in New Zealand).
13. Given these high design life and importance requirements, in accordance with the Building Code and NZS1170.5, the site has had a Site-Specific Seismic Hazard Assessment undertaken to better refine the seismic demands of the site. The ultimate limit state design level earthquake for the structure will be for a 2,500 year return period earthquake event.
14. The floor will be constructed with post-tension in situ concrete. The walls will be constructed of pre-stressed, pre-cast panels which are stitched with in situ concrete joints and post-tensioned horizontally. The roof will be constructed with post-tension in situ concrete supported on a grid of pre-cast columns.
15. A valve chamber is situated to the north-west of the reservoir site and houses the valves and operational equipment for the reservoirs. This will be up to six metres below ground (at the top side of the bank) to get the depth required to house the pipework. The below-ground structure will be reinforced concrete. The floor will be in situ reinforced concrete. The walls will be constructed of reinforced precast panels with in situ concrete stitch joints.
16. At the top of the reinforced concrete structure will be a prestressed, precast waler beam to complete the load path. Above ground level, the structure will be a light-weight steel portal structure. The steel portal structure will house a gantry crane for maintenance of the valve chamber and an electrical room. The inclusion of the gantry crane is what governs the height of the building.

17. The maintenance access for the reservoir will be by external stair to get onto the roof. The roof will have three hatches – one with an internal stair, one for emergency or diver access and one oversized hatch for lifting in large equipment. There will also be a hatch at floor level through the walls.
18. The valve chamber will be accessed for operations and maintenance through a series of internal stairs.
19. The reservoirs will be waterproofed to “Tightness Class 2” with two lines of sealant protection on all joints and possible leakage paths. The exterior of the reservoirs will also be sealed at the joints when the structure is below ground level. The valve chamber will have exterior tanking (similar to the basement of a building).

#### **RESPONSE TO SUBMISSIONS**

20. In his submission, Mr Ernest Needham raises concern about vibrations from construction having an adverse effect on the structural integrity of his residence. I confirm that no piling is required for the construction of the reservoir or valve chamber so vibrations will be minimal. Installing sheet piling to allow for temporary construction access will be the only operation that will cause vibration. I note that Mr Cottle responds to this submission point in his evidence and confirms that there will be a low risk of cosmetic damage to Mr Needham’s home.
21. No submissions raised any other matters with respect to the structural engineering of the reservoirs or the valve chamber.

#### **SECTION 42A REPORT**

22. I have reviewed the s 42A report and the peer review memo in Appendix J prepared by Simon Edmonds from Beca. I note that neither Mr Edmonds

nor Ms Galt raise any structural engineering concerns and seek no changes to the proposed designation conditions.

## **CONCLUSIONS AND RECOMMENDATIONS**

23. In response to matters raised by Mr Edmonds, the following will be incorporated into the detailed design:
- a) Item 21 of Appendix J – External membranes will be included over the in situ concrete stitches where the walls are intended to be backfill against (buried).
  - b) Item 22 of Appendix J – Allowing for the considerations of the tree roots. The RA has allowed for the walkway adjacent to the three oak trees (North East edge of the reservoir adjacent to Ruakiwi Road) to cantilever off the reservoir structure and therefore not load the root zone of the trees.
  - c) Item 23 of Appendix J – The roof is to have a 2% fall which is 620mm of fall from the centre of the roof. The current estimated settlements (after allowing for the proposed preloading of the site, refer to the geotechnical documentation) is in the order of 100mm. This means falls will remain at least 1.5% which is satisfactory.
24. Otherwise, I recommend no changes to the proposed designation conditions.

**Christopher Peter Lenssen**

**19 December 2025.**