

## SUMMARY STATEMENT

1. Tēnā koutou. Ko Michele Ann McDonald tōku ingoa. I am employed by the Christchurch City Council (**Council**) as team leader for the Three Waters: Water and Wastewater Asset Planning team.
2. I am a registered professional engineer and a Chartered Member of Engineering New Zealand. My evidence is supported by my 30 years of experience as a water services planning engineer, gained both internationally and in New Zealand.
3. I previously addressed water and wastewater infrastructure for low public transport areas in week 4 of the hearings (in relation to the residential zones topic).
4. This summary addresses my evidence on behalf of the Council regarding the inclusion of vacuum sewer capacity constraints as a Qualifying Matter in PC14.
5. My primary evidence outlines how different wastewater systems respond when capacity is exceeded. I have also outlined the factors to be considered when planning for infrastructure when the future demand is uncertain whilst ensuring the delivery of cost-effective infrastructure.
6. My evidence concludes that the three vacuum sewer systems in Christchurch are unable to service an increase in demand, let alone at Medium Density Residential Standards (**MDRS**).
7. Because of the integrated and interdependent nature of a vacuum sewer system, the complete system is impacted when capacity is exceeded in any part of the system. When flows exceed the design allowance of the vacuum pipes or the vacuum pump station, vacuum is progressively lost, reducing or negating the ability of the system to convey wastewater. Ongoing vacuum loss will result in a system collapse, meaning that no wastewater will be conveyed. Since no alternative routes have been provided for excess wastewater to be discharged out of the vacuum sewer systems, wastewater will eventually spill onto private property, resulting in severe public health consequences.
8. To enable MDRS development in a catchment that is serviced by a vacuum sewer system, the full capacity required to service all the properties at MDRS density standards will have to be provided simultaneously and upfront. A

progressive or component-based solution will not resolve the overall system capacity constraints.

9. I estimated the extent of duplication or replacement that would be required to accommodate MDRS intensification in the vacuum sewer catchments, by proportionally increasing the 2023 replacement value of the vacuum sewer infrastructure by the additional demand that would be triggered by MDRS density standards. This methodology suggests that an investment of up to \$240 million may be required to service 25,000 additional residential units, amounting to approximately \$10,000 per new unit. This being a conservative estimate may be sufficient to allow replacement of downstream infrastructure that will be impacted by the additional demand.
10. Because of the critical consequences of vacuum sewer capacity issues, as well as the extended and extensive work programme that would be required to provide sufficient additional capacity to enable MDRS density standards for any or all properties, I recommend the inclusion of a vacuum sewer capacity constraint Qualifying Matter in PC14.
11. My recommendation is supported by the single submission on the matter. Waka Kotahi notes that alternative pathways to adjoining wastewater systems can be obtained for individual sites. I agree with this statement but caution that adjacent wastewater systems do not have capacity to service intensification for all properties within a vacuum catchment. I therefore maintain that such an alternative solution could be offered to a select few only and depends on the location of the site.
12. Because of the inherent capacity of the city's gravity and local pressure wastewater infrastructure that can accommodate some growth through intensification, I do not consider that additional water and wastewater capacity qualifications are justified at this stage.
13. In conclusion, I maintain that infrastructure planning that aligns with a spatially focused growth plan will provide the best opportunity to implement infrastructure at the right time and to the right size to deliver cost-effective water and wastewater services to benefit the community at large.

Date: 5 April 2024

Michele McDonald