



RAINWATER TANK CALCULATOR TOOL TO OPTIMISE RAINWATER TANK SIZE

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ABSTRACT

New Zealand experienced serious drought in the summer of 2019. Auckland was especially hard hit with 77 continuous days of drought in 2020 contributing to the city's driest January-April period on record. In May 2020, Auckland's water storage lakes were down to just 42% of full capacity which prompted severe water restrictions. The drought has promoted big changes in the way water is used and made domestic rainwater harvesting rainwater tanks more popular.

The use of rainwater tanks for the supply of non-potable (e.g., outdoor activities, toilet, laundry) and potable water (drinking water) in rural and urban areas has substantial benefits to potable mains water savings as it can help enhance the sustainability of urban water use, reducing the abstraction, treatment, and conveyance cost of water. Moreover, the uptake of rainwater tanks for non-potable uses provides resilience to the overall domestic water supply system and could offset new water sources being required. Therefore, there was a need to develop an easily available and consistent calculation tool for people to use to choose rainwater tanks size according to their needs and acceptable reliance on tank water supply.

An online calculator was developed to determine the optimal sizing of rainwater tanks for various household water usages within the Auckland region. The rainwater tank sizing options are computed by long-term daily water balance analysis using long-term consumptions and rainfall time series data in Auckland. The online calculator enables rapid sizing of optimal rainwater tanks for various water usages including the percentage reliance on tank water supply and savings on potable water drawn from water mains. This online tool so far has seen a lot of usage by public especially the residents in Auckland and positive feedback has been received regarding the ease of use or user friendliness of the tool.

Long-term water balance analysis shows a non-linear relationship between roof area and rainwater tank size and demonstrates that the use of rainwater tanks for the supply of non-potable water in urban areas could provide substantial mains water saving benefits. The tool can also provide better understanding of potential use and sizing of rainwater tanks in the future which will be useful in three water modelling. The analysis provides relationships between the potential mains water savings, roof areas, rainwater tank sizes, number of people in household and reliance on tank water supply (%). The tool can be used in other parts of New Zealand to quantify better performance assessment of rainwater tanks for household water usage.



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Further investigations will be carried out to assess the effects of spatial variability of rainfall on the optimal sizing of rainwater tanks based on long-term water balance analysis using daily rainfall time series data from various rainfall gauges across the Auckland Region. The tool will also be used to quantify the sensitivity of sizing rainwater tanks based on future long term rainfall time series data in Auckland.