Hourly rainfall from daily records –   
a method of fragments now and into the future

L Millard1, M Batchelor2

1.Principal Engineer, WRM Water & Environment Pty Ltd, Brisbane QLD 4000. Email:Lindsay.millard@wrmwater.com.au

2.Senior Principal Engineer, WRM Water & Environment Pty Ltd, Brisbane QLD 4000.

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# ABSTRACT

Effectively managing water is essential for safe and productive mining operations. Although continuous simulation models assist in predicting water storage overflows and duration, they have been constrained by rainfall data that only provides daily totals. This limitation does not reveal the risks from heavy rainfall that can occur within a 24 hour period. Our paper presents an approach to generate 136 years of hourly data based on nearby donor rain gauges to enhance the rainfall record and overcome data limitations. Our approach gives mine operators a clearer picture of risks. We also incorporated the latest climate guidance from Australian Rainfall and Runoff v4.2 to ensure predictions account for expected climate changes.

The method involved processing daily rainfall data and combining it with sub-daily measurements from surrounding areas. We successfully generated 136 years of hourly rainfall data that matches historic Bureau of Meteorology statistics. The data was then adjusted to align with current and future climate horizons.

For mine operators, this means more reliable predictions about water management challenges. The improved accuracy helps inform decisions about water storage design, pump capacity, and flood mitigation measures. This is particularly valuable for mine sites lacking long-term sub-daily rainfall data, as it provides a robust way to assess water-related risks.

The resulting dataset offers two key benefits: it supports more detailed continuous simulation in areas with poor data coverage, and it provides greater confidence in predicting future conditions. This helps operations managers make more informed decisions about water management strategies, both for current operations and future planning.

This provided greater confidence in defining the probability of risks through the use of a continuous simulation model. In this way, we demonstrate a statistically robust approach that utilises all available data and provides site managers with greater confidence in the appropriate management of water quantities now; and into the future.