

**WALLINGFORD PROCEDURE USER GROUP**  
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**USING ANNUAL RAINFALL TIME SERIES**

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**SYNOPSIS**

This paper describes what 'Annual Rainfall Time Series' are, how the requirement for long computer runs has been avoided and how they are applied to sewerage rehabilitation planning.

**ANNUAL RAINFALL TIME SERIES DESCRIPTION**

Annual Rainfall Time Series are constructed from a long rainfall time series and represent twelve typical months in terms of rainfall statistics of central tendency from that series. As they are typical months when joined end to end, the result is a typical year. The fact that the series is representative of a typical year means that annual statistics of sewer systems can be established. In particular statistics of overflow and pumping station operation can be determined.

**COMPUTING TIME CONSTRAINTS**

Simulating a sewer systems' response to a years rainfall can be costly in terms of CPU time. For that reason, strategies of sampling from within the time series events which are representative of the year have been established. CPU cost savings using these techniques are considerable. Using a preferred scheme the accuracy is maintained by running only 25% of the events through the model.

The sampling schemes are polarised to those events causing the most runoff. In this way the significant events from the typical year are included in the analysis. Ranking of the events on the basis of potential runoff volume allows this. Typically the sample will consist of the first five events and the fifth thereafter from this ranked series.

**APPLICATION TO REHABILITATION STRATEGY**

The annual time series have been applied to rehabilitation strategy in two ways.

Firstly they have been used in the analysis of existing systems to determine frequency and quantity of effluent spilt from overflows. The adherence of the overflow to the consent condition and the receiving watercourse to the environmental quality objective can then be assessed.

Secondly they have been used in the design of rehabilitation works including overflows to predetermined consent conditions.

Consider an overflow on a system upgraded to cure flooding problems which is to be designed to spill not more than 3 times per year. The volume spilt at the overflow location in the event ranked 4th in the annual rainfall time series is