

## BOLTON RIVER WATER QUALITY CASE STUDY

W Lomax Bolton MBC A. Parkinson NWW

The planning for the renovation of the Bolton's sewerage system has coincided with the introduction of the Sewerage Rehabilitation Manual Interim Procedure and the Regional Sewerage Rehabilitation Review, carried out by Water Research Centre in conjunction with North West Water and 17 local councils. The object of the latter exercise was to estimate the capital requirements to achieve acceptable regional levels of service for sewerage (i.e. structure and flooding) and pollution. North West Water has a long term aim to restore existing Class 3 and 4 rivers to Class 2 (1). A timescale of 25 years has been set to achieve this aim.

Bolton was the first of the Review areas to be investigated and a Time Series Rainfall analysis (the first 5 storm events and every 5th up to 99) was produced. It was evident that the Class 2 stretch of Middle Brook received a total of 3000m<sup>3</sup> spread over the Class 2 stretch.

The dry weather flow in the stream at this point is 4 Ml/d. A ratio of volume discharged during the first rainfall event, per km length, to the dry weather flow in the stream was established: 1000 m<sup>3</sup>/km<sup>4</sup> Ml/d. This was taken as the standard for a Class 2 watercourse. To support this hypothesis, Captains Clough Brook adhered to a similar loading rate (2000m<sup>3</sup>/3.5 km/3 Ml/d) and other Class 2 streams within the Review Area were found to similarly conform.

By contrast, 3km of the Croal Minor receives 13600 m<sup>3</sup>, including 5000 m<sup>3</sup> from Jenny Beck which is considered as an input to the main stream because of its proximity to it. With a dry weather flow of 12 Ml/d, this length of the Croal Minor should be able to absorb 9000 m<sup>3</sup> on the first storm event based on the standard derived from Middle Brook. This information has been utilised by Bolton MB during the Rehabilitation Review and in consideration of the Bolton Centre Sewerage Project.

Other criteria were also laid down:

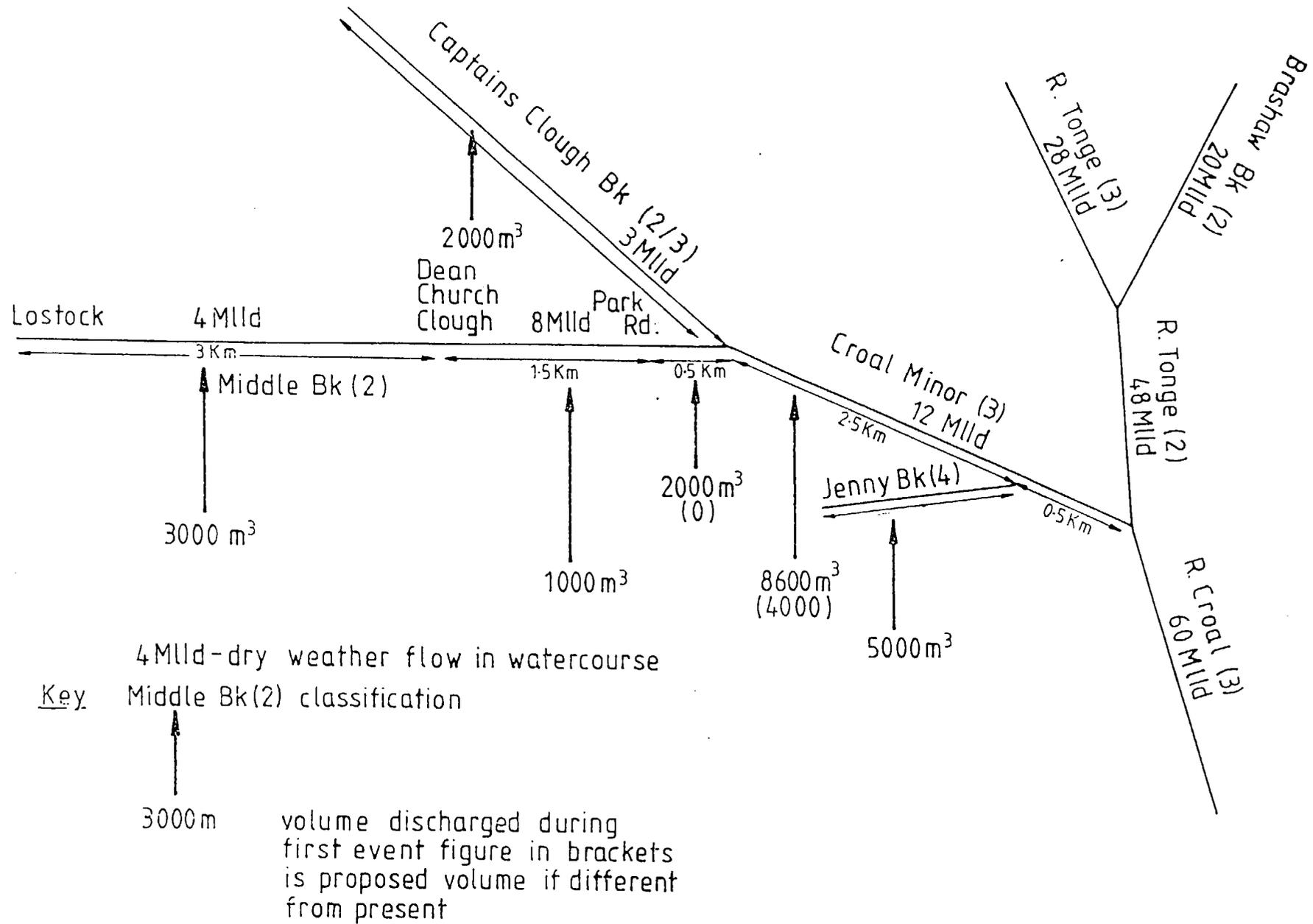
Any overflows should have a minimum setting of Formula A and be of modern design:

2000m<sup>3</sup> are presently discharged on the first storm into a 0.5km stretch upstream of Captains Clough Brook. This part of Middle Brook is deep and slow-moving and it was deemed not a suitable location to receive storm sewage.

This approach has been extended by WRC into the CARP (Comparative Acceptable River Pollution) Procedure which compares the subject stream, in stretches, with Middle Brook for the range of rainfall events. By introducing a load factor, if strong trade waste is present, a rating curve can be produced for any watercourse/sewage system for which Time Series Rainfall has been run.

Having completed the options for the renovated Bolton sewerage scheme, Time Series Rainfall using selected events, will be run to determine if the criteria has been met. It will also enable the frequency of discharge from proposed overflows to be obtained.

# PRESENT & FUTURE STORM SEWAGE VOLUMES TO CROAL MINOR



SESSION 2 - DISCUSSION

J. Packman, Institute of Hydrology.

No disagreement with Professor O'Connell on the need for a time series approach to rainfall inputs, but disagreed that the use of design storms assumed T-year rainfall gave T-year run-off. The design storm profiles and UCWI values were chosen after an extensive analysis of rainfall time series, similar in many ways to that proposed by Professor O'Connell. Thus storm shape was not assumed, but chosen to yield a consistent estimate of T-year run-off peak. The analysis required considerable computer facilities, and had to be restricted to peak flows - it was not extended to consider volumes directly. Since that analysis, computer power has greatly increased, and it is now becoming feasible to perform the analysis on an individual catchment basis - considering not only T-year peaks but overflows and storage volumes also. However in many cases (not involving storage) the simpler design storm approach will yield similar results and with considerably less effort.

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B. Wilkinson, Yorkshire W.A.

How were the eight events selected for the Bolton study?

A. Parkinson, N.W.W.

The selected rainfall events were 1,3,10,25,40,60,80,99.

Event 1 :- the largest (by volume) of the first five events, 20% larger than events 2 - 5.

Event 3 :- the second largest of the first five events.

Event 10:- gave volumes discharged similar to those from events 2 - 5.

Event 25:- a long duration, low intensity storm i.e. SSO's with low settings will give high volume of discharge, and SSO's with high settings will give low volume discharge.

Event 40:-  
Event 60:-  
Event 80:-  
Event 99:-

{ included  
to obtain  
frequency of  
discharge