(e) Tide Locked Outfalls

- Dr T Hughes

The increasing development of coastal regions for industrial and residential projects coupled with the need for drainage authorities to specify uniform design standards against the risk of flooding has created the need for an acceptable method of analysing cathcments subject to tidal influence.

Historically drainage authorities have adopted specific standards (e.g. 20 year return period) for their inland systems and require that the design discharge should be passed without surcharge. In tidally affected catchments the same general standards are adopted together with, typically, the requirements that either:-

(a) storage be provided on site to allow the total containment of the design hydrograph over the tide locked period, or

(b) the design flow should be able to pass over a fixed tidal level.

In both cases the tide locked period (a) or the fixed level (b) are arbitrarily specified, usually associated with a coincidence of peak flow with high tide for a relatively extreme tidal cycle (e.g. highest astronomical tide). The adoption of such a method leads to an indeterminate design return period and may lead to a system which is capable of handling an extremely unlikely coincidence of storm and tide but yet fails to pass a more likely combination of events.

T Lloyd, Wirral BC

What is the effect of a tidal barrage on the results.

Dr Hughes

Tidal barrages smooth the peaks and troughs but have the overall effect of raising the general tide level which would thus be detrimental to the performance of a system.

G Catterson, North West Water Authority

Is the speaker aware of a paper by Holden & Haynes "The Effect of Tides on the Design of Sewerage Systems".

Dr Hughes

The paper mentioned approaches the problem differently and does not therefore have any relevance to this research.

G Pettigrew, Sir William Halcrow

How can the results be produced without hundreds of computer runs.

Dr Hughes

Intention to consult with the industry to produce general guidelines based on this approach thus overcoming the need to make many computer runs.

B Fairhurst, Liverpool Polytechnic

Has any allowance been made for surge as this is a significant problem on the Fylde coast.

Dr Hughes

No allowance was made for surge as figures were taken from the Admiralty tide tables, generally surge is not significant and is therefore unlikely to effect the research to date.

J Turner, Leeds City Council

Could this approach be applied to a balancing pond which is pumped to a river, and thus involves prediction of two probabilities as in Mantz and Wakeling.

Dr Hughes

The application of a method which uses only the return period of individual events and not the resulting levels is not fundamentally correct.

f) Tide Locked Outfalls

Dr. T. Hughes, University College, Cardiff

See Leeds Meeting for Synopsis

Discussion:-

J. Higson, Welsh Water

Having problems modelling tides as WASSP crashes immediately.

Dr. Hughes

WASSP was not used in the development of this approach although the theory holds true for WASSP models.

M. Osborne

You may have experienced unlikely results as WASSP cannot take account of free surface backwater effects and will only reflect the level from the level hydrograph back into the first pipe up the system.

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R.B. Currie, Borough of Newport

Attempting to model the effects of a barrage causing some outfalls to be permanently drowned.

Dr. Hughes

Have carried out work on the Cardiff system to examine the effect on a system pre and post barrage. Level fluctuations are reduced but there is a general reduction in the performance of the system which would be expected.