

Groundwater Flood Prediction and Warning for the River Itchen Environment Agency

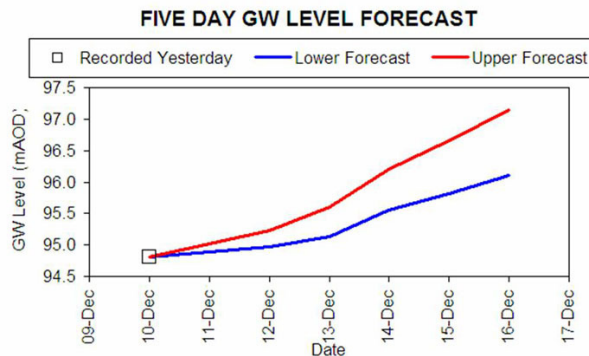
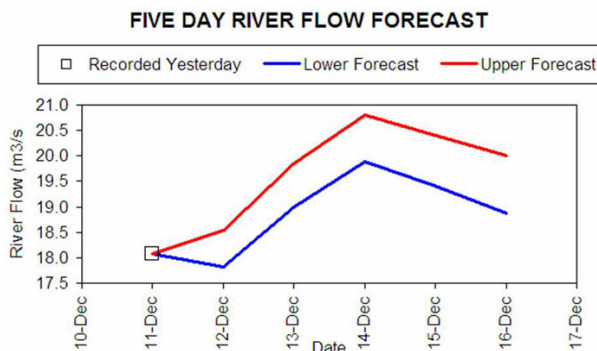
Groundwater-related flooding is becoming an important issue in many chalk catchments. The Environment Agency Southern Region commissioned Entec to design, construct, calibrate and verify a flood prediction model for the groundwater dominated Upper River Itchen, that defines the relationship between rainfall, groundwater levels and baseflow in the river. The model is needed to predict groundwater levels and river flows at designated flood forecasting points around the Upper Itchen, particularly in Winchester, and also to provide input to a rainfall/runoff model used for flood warning in the Lower Itchen catchment.

The work built on Entec's conceptual understanding of the hydrogeology of the chalk aquifer and the numerical models already built for the consideration of lower flow issues. These modelling tools included:

- the '4R' daily rainfall, runoff and recharge model; and
- a 'MODFLOW' groundwater model which was adapted to run on a daily timestep through the critical flood periods.

Conventional lumped parameter flooding models such as the Thames Catchment Model (TCM) and Probability Distributed Model (PDM) were also considered during the initial feasibility stage.

However, the relatively poor predictive accuracy of these tools at high flows and their operational functionality which (for MODFLOW) is cumbersome in the flood forecasting arena, led to the conclusion that much simpler predictive spreadsheet models would be more appropriate for National Flood Forecasting System (NFFS) application.



The spreadsheets use relationships developed between observed groundwater levels and flows, and antecedent rainfall to make predictions of the future flows and levels based on the five day Meteorological Office forecasts. They are quick and easy to run within the NFFS shell, represent a logical extension of systems of observation borehole trigger and alarm levels already being used, and should be valuable in predicting the time to peak and duration of groundwater flooding which are not well simulated by conventional flood models.

Groundwater flood modelling on the River Itchen

