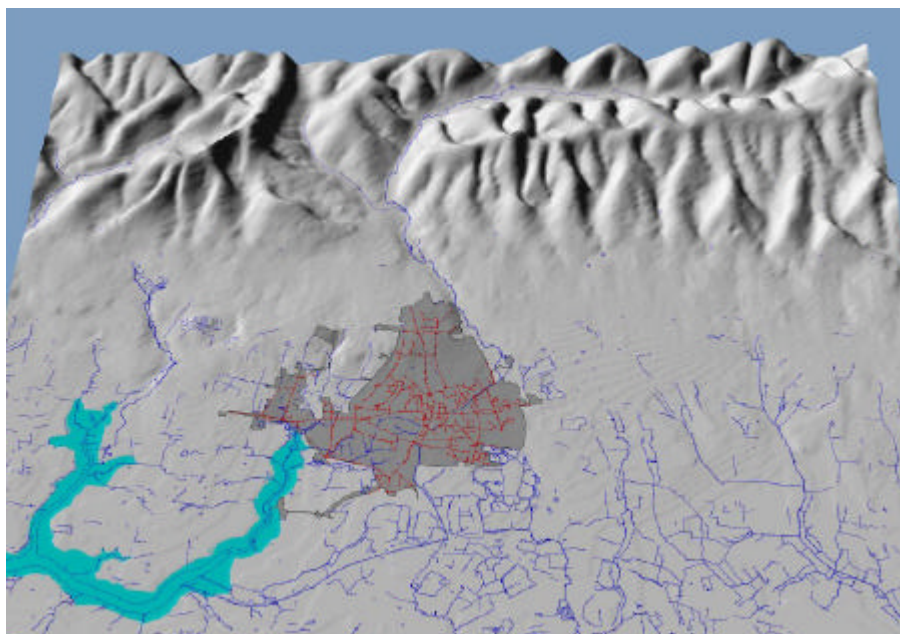


Paper Presented at the Infoworks User Day, September 2003

The presentation on a methodology for modelling seasonal variations in Groundwater Infiltration was illustrated with a Case Study for Chichester which is a historic City in West Sussex dating back to Roman times. Chichester is the County Town of West Sussex and it lies on the coastal plain nestling beneath the South Downs.



The soil conditions at Chichester are predominantly coarse gravels which allow relatively simple transmission of groundwater. There is a very large variation in groundwater levels in the city and surrounding areas with typically a 4 to 5 metre difference in groundwater levels from a maximum in winter (usually February) and the minimum which normally occurs in October. As a consequence of these changes in groundwater levels there is a marked variation in groundwater infiltration into the sewers from less than 40l/s to over 210l/s.

It was essential that the variations in groundwater infiltration were accurately modelled for the analysis work carried out in connection with demonstrating compliance with the Shellfish Waters Directive. This Directive required 15 years of rainfall to be simulated and the spills at CSO's and the storm tanks at the WwTW's assessed to determine whether they spilled more or less than 10 times per year on average. Obviously the winter period when there was more rainfall was also the time when the groundwater infiltration flows were at their highest.

A number of possible methods for modelling the variation were investigated but the procedures summarised below were finally adopted.

Method adopted

1. A flag should be set called "Groundwater Infiltration" with the abbreviation "GI" (all subsequent work on groundwater infiltration should use this flag);
2. Set the 'Other' system type to "Groundwater";
3. Add dummy sub-catchments at appropriate locations (the Modeller will need to decide how many sub-catchments to add and at what locations). The sub-catchments should all be set at 0.99ha;
4. All surfaces should be set to zero;

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5. The population figure should be set to the required summer infiltration flow (eg a summer infiltration of 23 l/s should have the population set as '23');
6. A special Wastewater Profile (named "Groundwater Infiltration" should be added (it may also be necessary to create a new Land Use if the infiltration does not uniformly vary across the catchment) with a water consumption of 86,400 l/h/d;
7. The variation between summer and winter should be determined and if possible the variation at each month of the year compared with the lowest figure (probably September / October);
8. For the "Groundwater Infiltration" Wastewater Profile set the Weekday Calibration and Weekend Calibration to a constant value of '1.000'. Set the values for each month in the Monthly Calibration as multiples of the lowest value (ie '1.000' for the lowest, '1.500' for a 50% increase, '2.000' for a 100% increase etc);
9. Before any storm simulations are run a trial should be undertaken for a whole year but with no rainfall to check that the above method has worked successfully and achieved the required flows.

