Groundwater Asset Management

A Chalk groundwater source

Plan Design Enable

Simon Wood (Atkins) & Mike Packman (Southern Water)

Groundwater Asset Management
10 September 2008

The challenge

“Maximising deployable output from a groundwater source that effectively becomes a river intake for approximately 10% of the time”
The geology

The problem
The mechanism

The pathway (1)
The pathway (3)

The analysis (1)
The analysis (2)

Despite having relatively low flows and similar magnitudes of aquifer to river hydraulic reversals during both periods, ABH3 pumped turbidity much higher and Stephano mid-May. Fias flow expiration is the accumulation of turbidity in the fissure network over the summer during successive hydraulic reversals of the river.

The analysis (3)

Despite having relatively low flows and similar magnitudes of aquifer to river hydraulic reversals during both periods, ABH3 pumped turbidity much higher and Stephano mid-May. Fias flow expiration is the accumulation of turbidity in the fissure network over the summer during successive hydraulic reversals of the river.
Text box RHS - ABH2 turbidity does appear to be shown on graph.
Packman, 03/09/2008
The analysis (4)

![Graph showing water quality constraints on deployable output of a chalk groundwater source.]

The analysis (5)

![Graph showing sample data of Berphan ABH 1.]

**The analysis (4)**

1. The graph illustrates the relationship between the height of water levels above the ABH3 groundwater level and turbidity over time.
2. The turbidity starts rising rapidly in ABH3 as soon as the hydraulic gradient is from river to aquifer, i.e., when the height of the river above ABH3 GWL is >0m.
3. The turbidity starts to drop rapidly in ABH3 as soon as the hydraulic gradient is from aquifer to river, i.e., when the height of the river above ABH3 GWL is <0m.

**The analysis (5)**

- Sample data for Berphan ABH 1 with a graph showing the distribution of particle sizes and volume percentages.
- Sample data from 07.10.08 to 02.10.09.
**The solution**

The impact of the solution

- PDO originally 7.7 Ml/d and MDO 5.3 Ml/d based upon precautionary operation of source. Water quality was a poorly defined constraint.

- PDO now increased to 14.0 Ml/d and MDO to 9.3 Ml/d due to better understanding of timing and mechanism of turbidity breaches. Turbidity still a constraint but a well defined constraint.

- Filter replacement costs can be minimised by operation of sources according to new protocols developed.
The conclusion

Improve the hydrogeological understanding of your source – it may be a more cost-effective solution to a water quality constraint than treatment.