



# The use of groundwater models as arbiters: a case study from the UK

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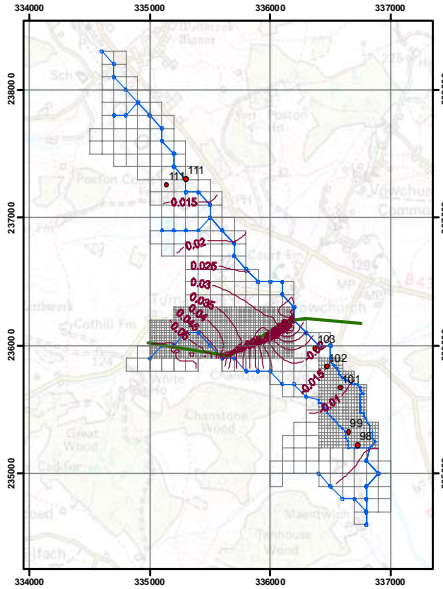
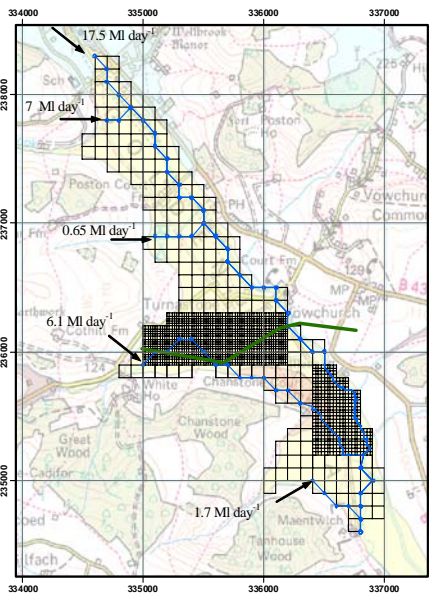
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## INTRODUCTION

A pipeline to carry gas from a port in Wales to the demand centres in the English Midlands is currently under construction. The pipeline has to cross a number of river valleys. One of these river crossing, the River Dore, involved digging a trench through a sensitive shallow alluvial aquifer, which is currently being exploited for public water supply. There is a concern that both the construction work and the pipeline itself will impact the groundwater abstraction. All the stakeholders were involved in discussions about the likely impact, which was simulated in a hydrogeological and modelling study.



Two models were developed; a single layer model and a two-layer model. Both models were used to investigate the impact of the pipeline on the abstraction boreholes. The long-term impact was shown to be negligible (see left). This was backed up with simple Darcian flow calculations (see below).

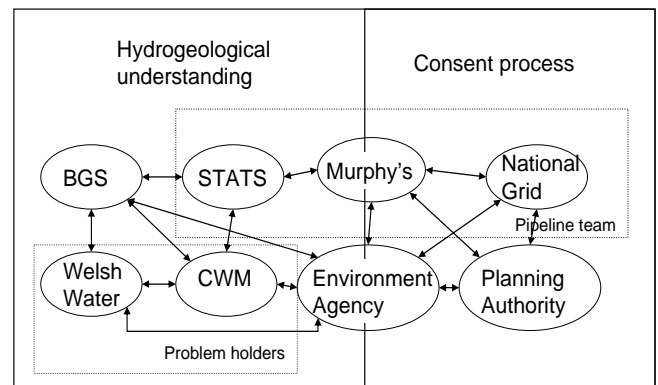
**Legend**  
Differences between groundwater heads simulated with and without the presence of the pipeline

## SUMMARY AND CONCLUSIONS

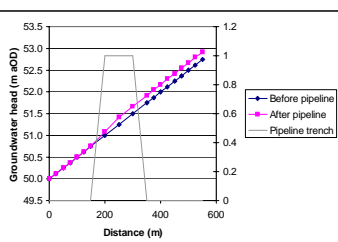
This study has demonstrated that groundwater flow models, even when data are limited, can be used as arbiters between the different stakeholders involved in the decision-making process. A relatively simple groundwater flow model was developed and applied to investigate the impact of trenching a pipeline through a shallow, sensitive alluvial aquifer.

## MODELLING UNDERTAKEN

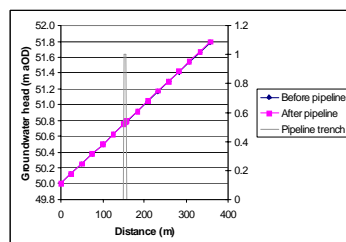
Groundwater flow in the alluvial sediments associated with the River Dore were investigated. A geological and hydrogeological understanding was developed and encapsulated into a numerical model. A ZOOMQ3D model was built, using grid refinement around the wellfield and the proposed path of the pipeline (see above). The boundaries of the model was chosen as the outcrop of the alluvium and points upstream and downstream of the wellfield sufficiently far away so as not to impact the abstraction boreholes. Recharge was supplied from a ZOODRM model.



The model results demonstrated limited long-term impact from the placement of the pipeline. These results were accepted by all the stakeholders involved. Given the complexity of the relationships between the stakeholders (see above), and the potential for conflict, this was a welcome outcome. The process of developing the model in discussion with the stakeholders enabled everybody to see that the modelling process was representing the technical issues sensibly and reasonably. In this way the model output was accepted by all the stakeholders and the model acted as the arbiter for all the parties involved in the decision-making process.



(a)



(b)