

1. Groundwater Degradation

Point Source soluble conservative pollutants in Thames Basin Chalk

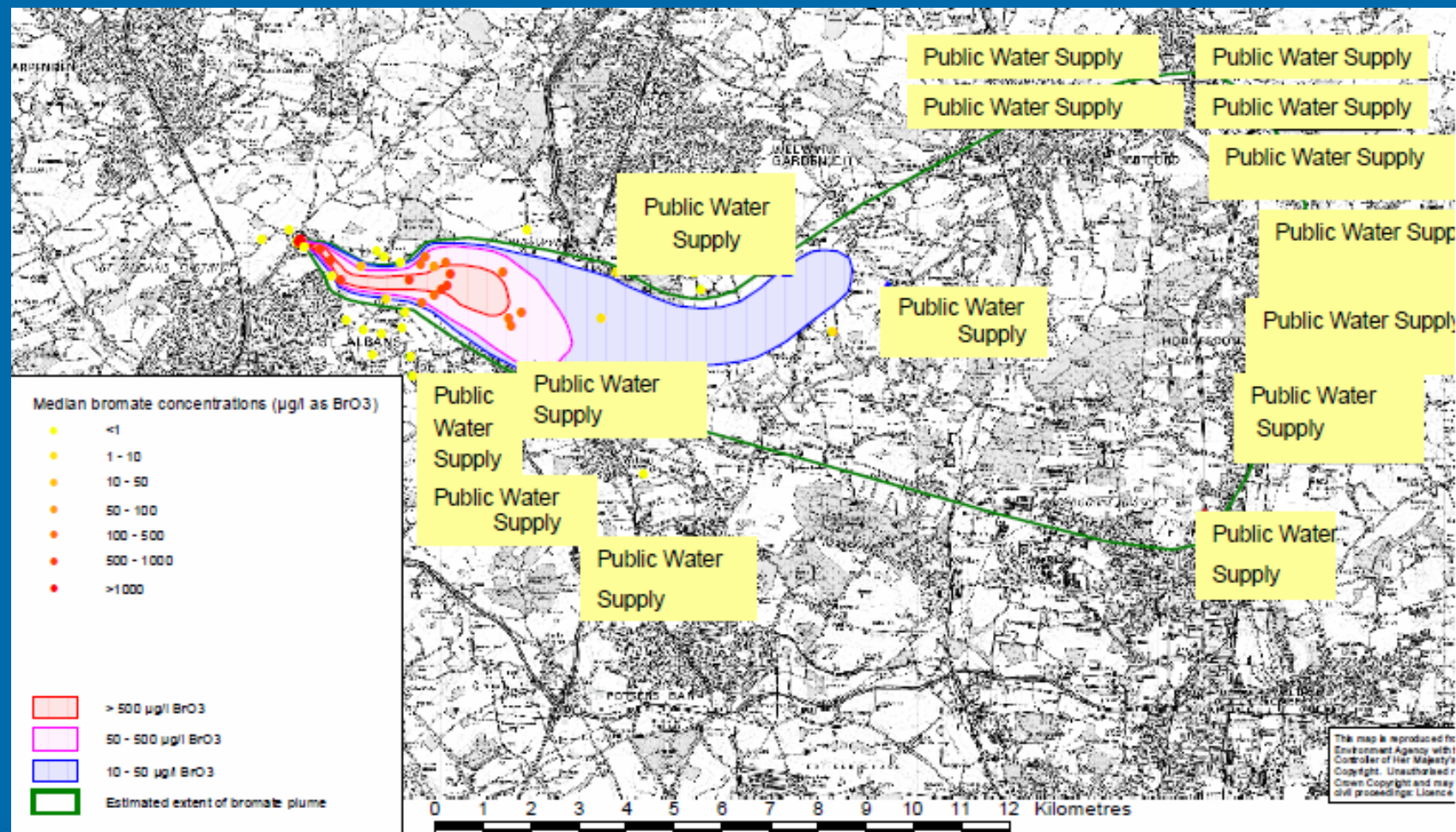
Jenny Thomas, Groundwater Quality Technical
Specialist Thames

Better Thames Network
Groundwater Workshop 18th April 2012

Case study 1a, Bromate

- ➡ Plume extending over 20km in the Chalk from a former industrial site
- ➡ Factory closed in 1980
- ➡ In spite of apparent soils clean-up and mass removal through abstraction, bromate concentrations in groundwater remain both high and stable
- ➡ Indicates a large mass of stable bromate within the aquifer

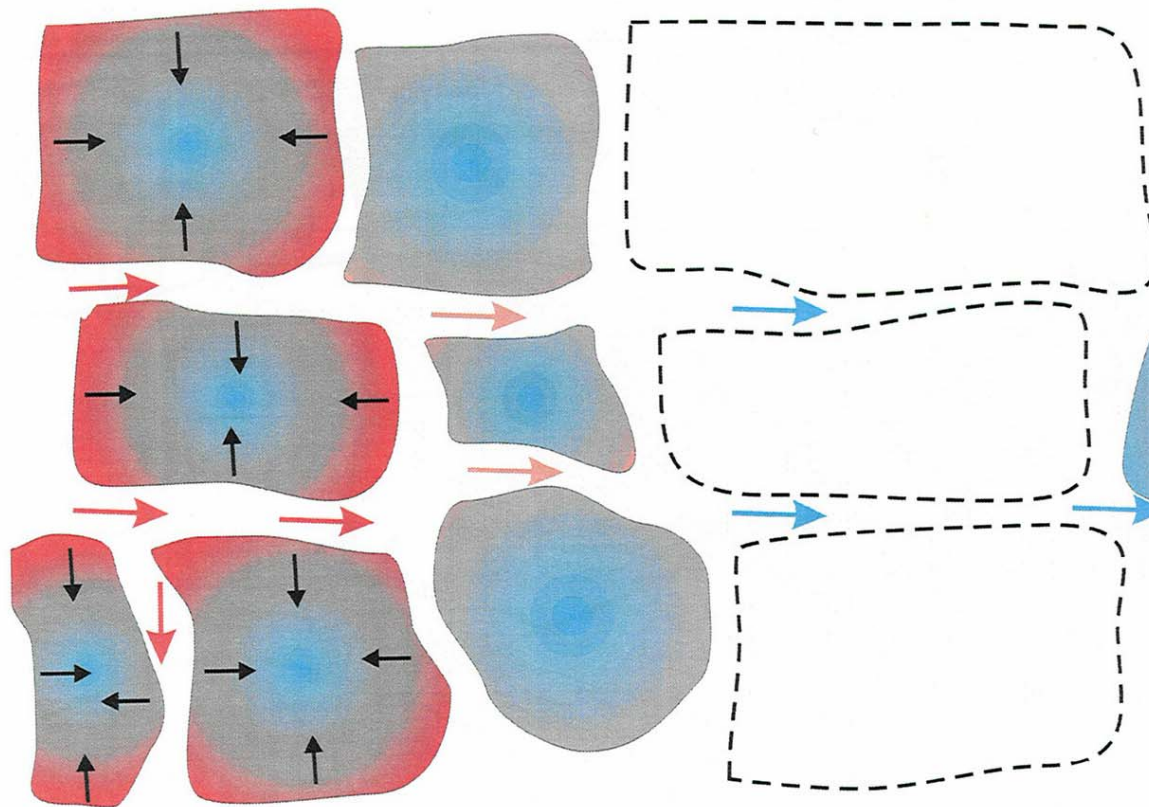
Location of Bromate Plume



Workshop Objectives

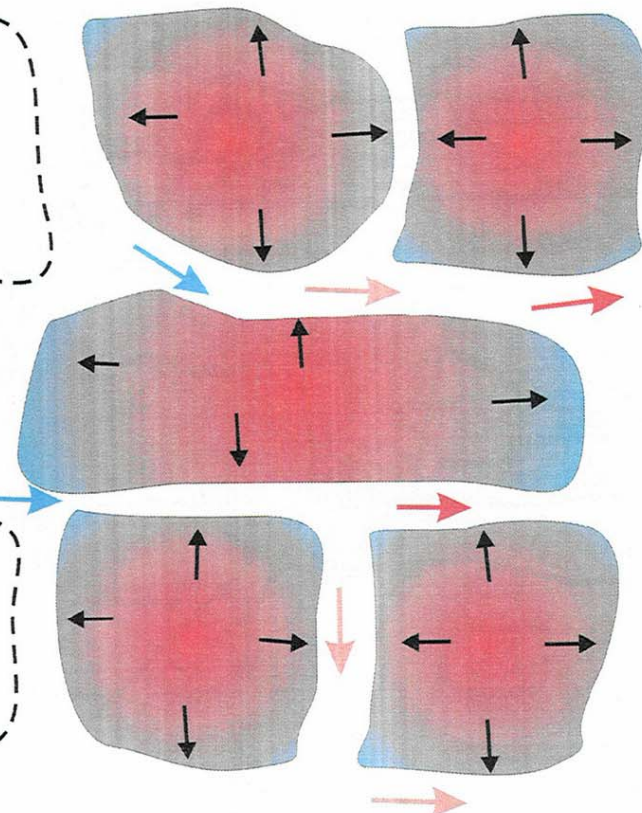
- ➡ We have this and nitrate failures
- ➡ Additionally, the “prevent and limit” WFD objective is the most important for groundwater.
- ➡ We need to understand acceptable input limits for common conservative ions – mainly non-hazardous pollutants
- ➡ In contrast with Case Study 1a, Case Study 1b shows no widespread pollution from a conservative ion but could there be future problems because build up in the matrix is much slower than in the case of diffuse pollution?

**Elevated fissure water concentrations
(during expansion of the plume)**



Diffusion of contaminants into
matrix blocks from contaminated
flowing groundwater

**Elevated matrix porewater concentrations
(during contraction of the plume)**



Diffusion of contaminants out
of matrix blocks to contaminate
flowing groundwater

Workshop Objectives cont.

- ➡ Can a clear relationship between concentration in and concentration out be defined?
- ➡ What is the critical input concentration & duration leading to
 - ➡ Groundwater degradation/deterioration
 - ➡ Exceedance of DWS or EQS?
- ➡ How reliable is the ConSim “soakaway” option for point sources?
- ➡ What is the likely affect of climate change?
- ➡ Can Thames Chalk groundwater concentrations be calculated to provide an improved predictive tool?

Follow up questions

- ➡ Some current WFD failures of nitrate may be better explained by point sources than diffuse sources?
- ➡ What is the capacity of the Chalk in terms of dilution and dispersion of conservative ions?
- ➡ Could the impact on groundwater become evident only once the contaminant diffuses back out from the matrix?
- ➡ A review of the existing literature on the dual porosity of the Chalk as an initial step?