

A Water Company Perspective Urban Groundwater for PWS

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Presentation structure



- An introduction to the STWL area
- Catchment risk assessment and DWSPs
- Existing problems with sources in urban areas
- New risks
- New source development in urban areas
- Summary of key issues for PWS

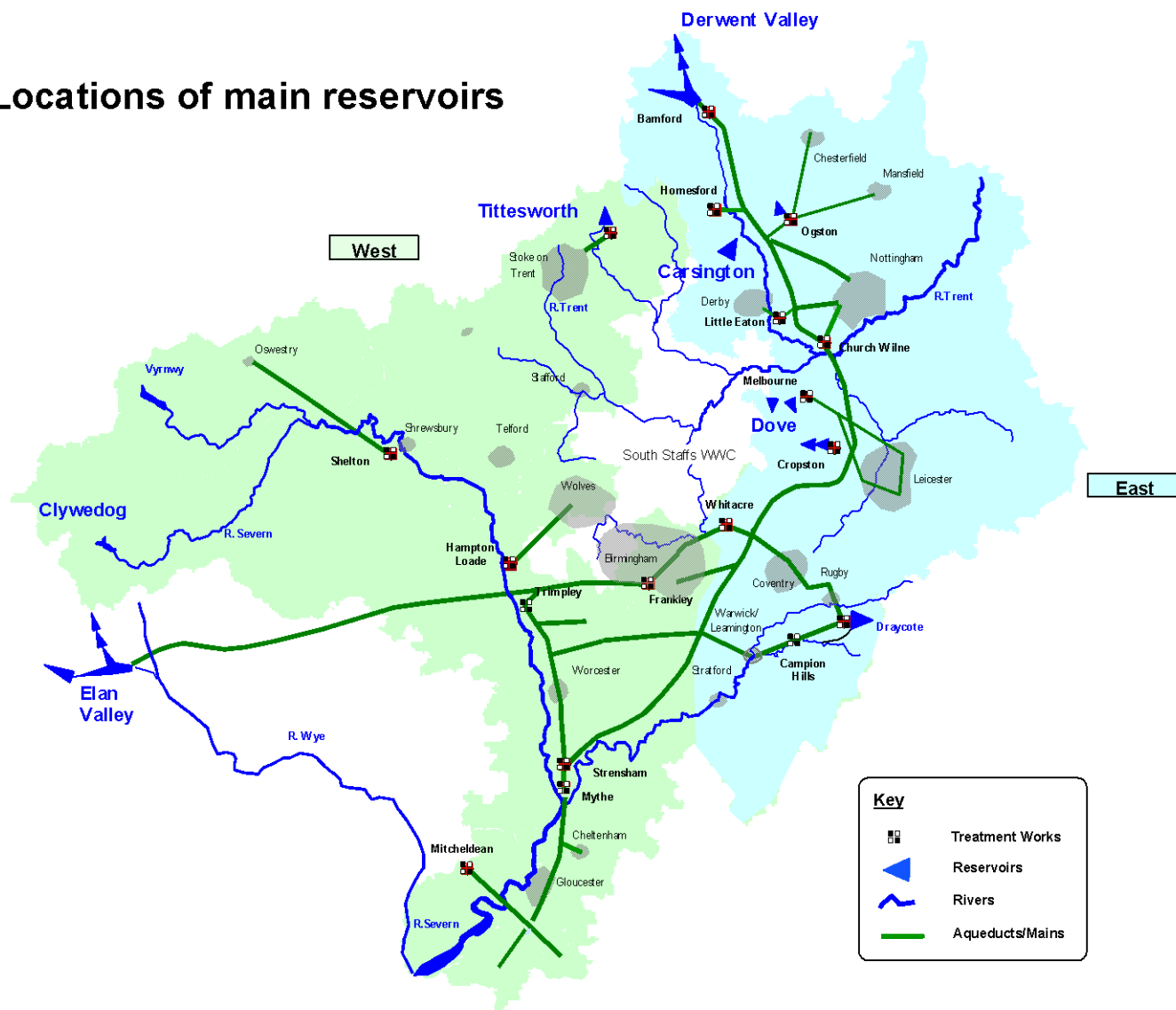
Severn Trent sources of supply



Locations of main reservoirs

Annual average supply
1700 – 1900MI/d

1/3 reservoirs
1/3 rivers
1/3 groundwater



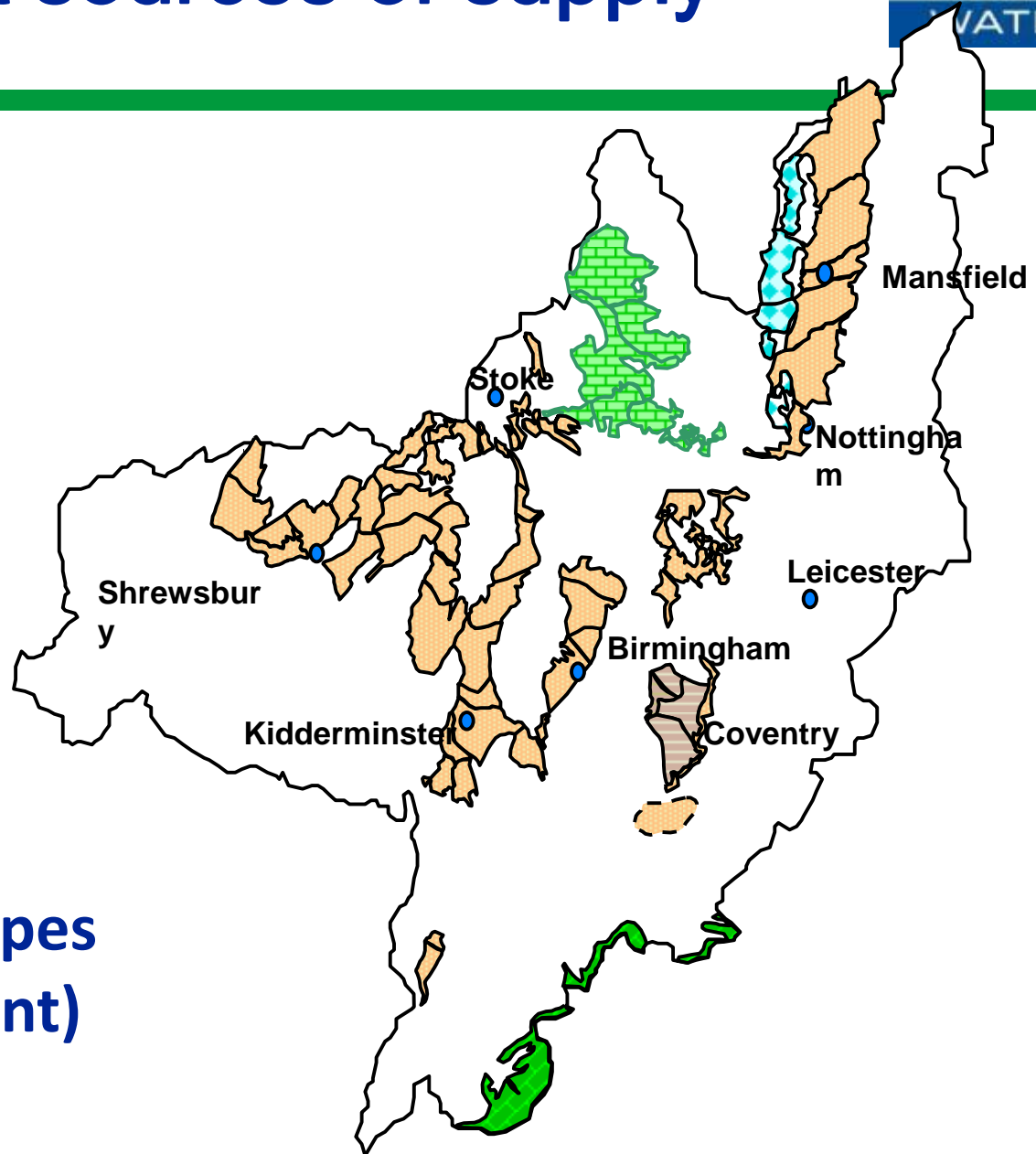
Key

- Treatment Works
- Reservoirs
- Rivers
- Aqueducts/Mains

Severn Trent sources of supply

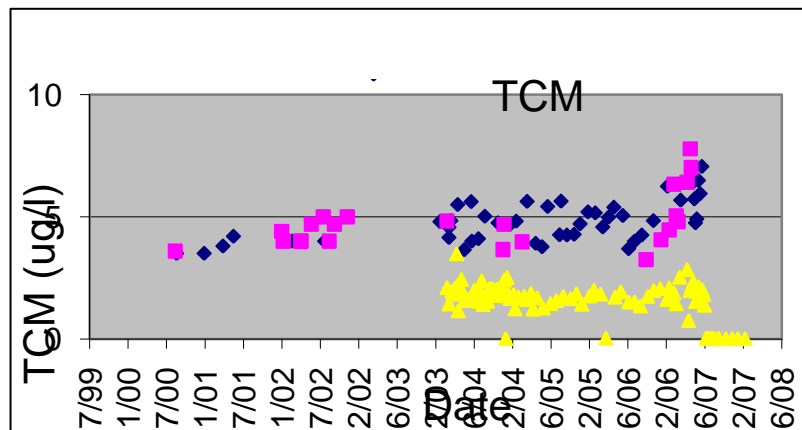
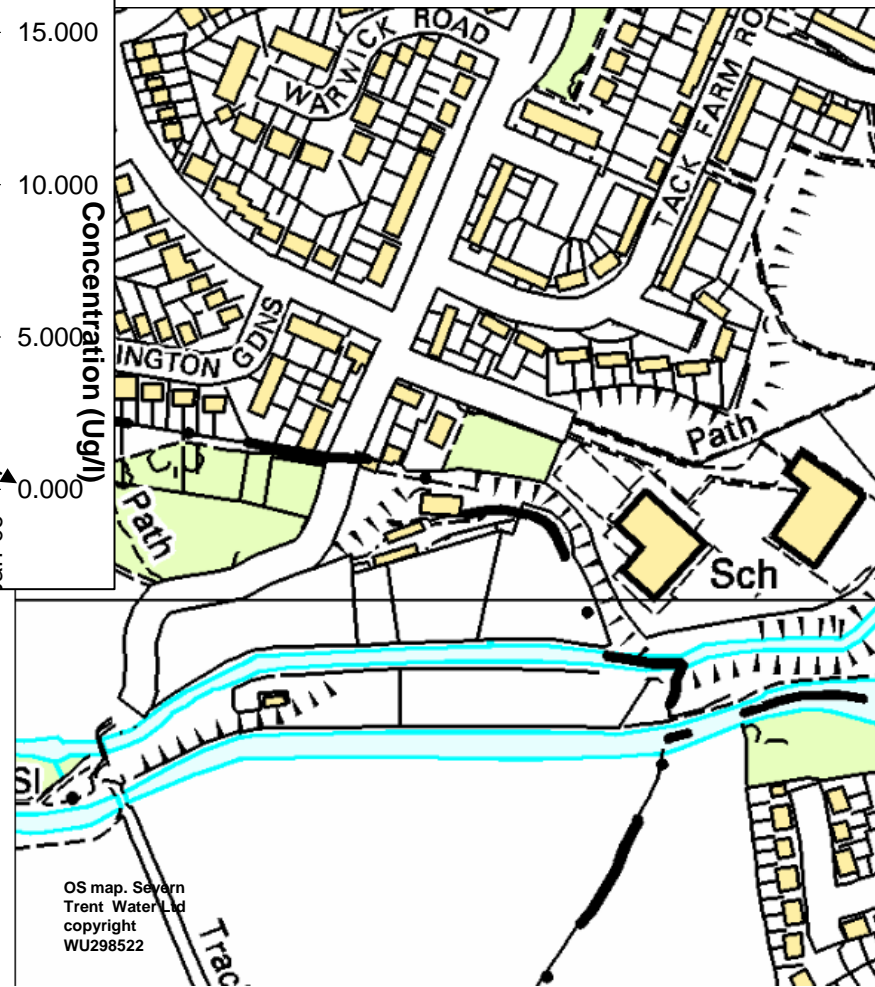
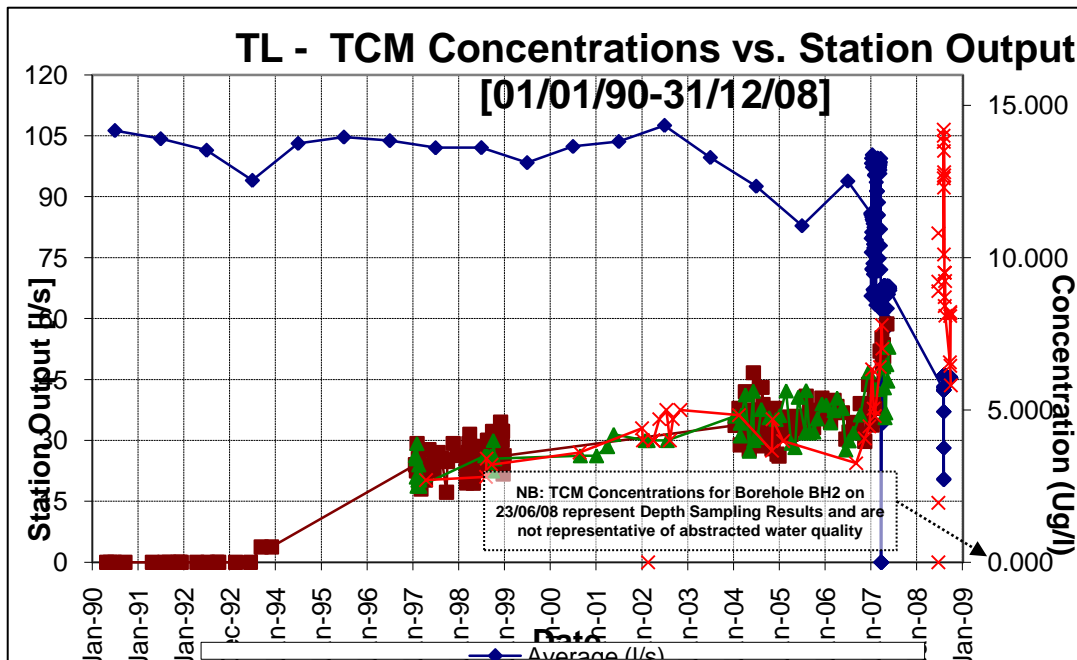


- Sherwood Sandstone 
- Carboniferous Limestone 
- Magnesian Limestone 
- Permo-Carb. Sandstone 
- Jurassic Limestone 



**Major Aquifer Types
(unconfined extent)**

Examples of Urban Source quality



Examples of Urban Source quality

Figure B2 CHCs in Groundwater at BH2

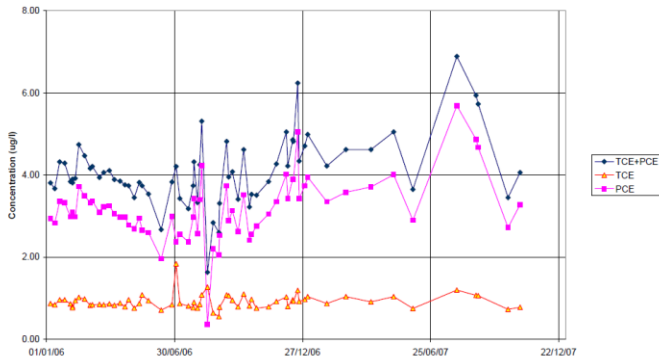
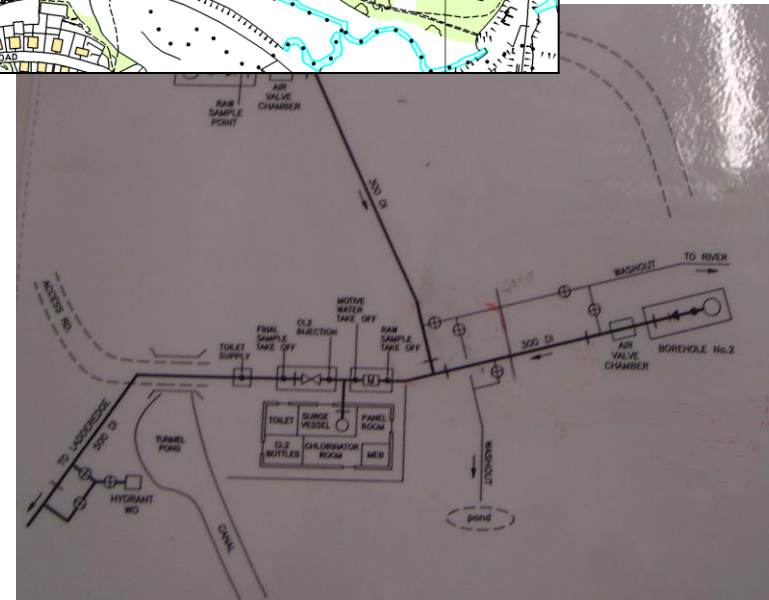
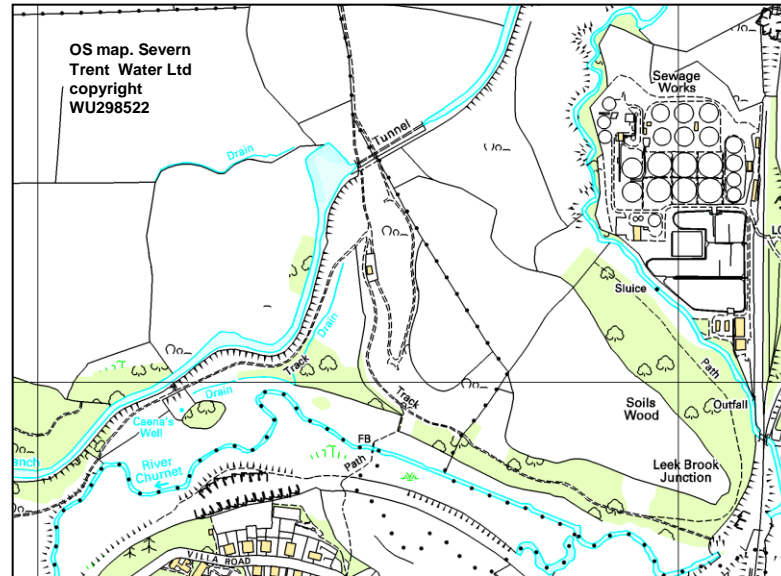
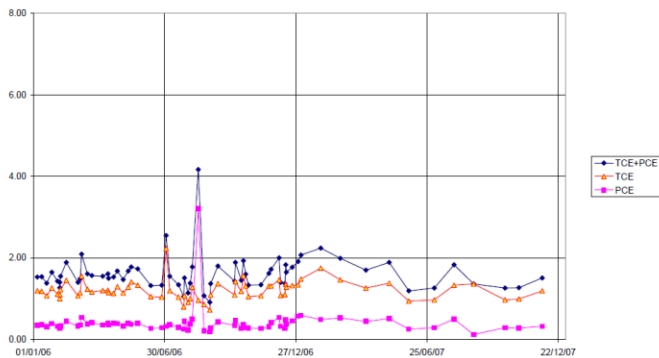
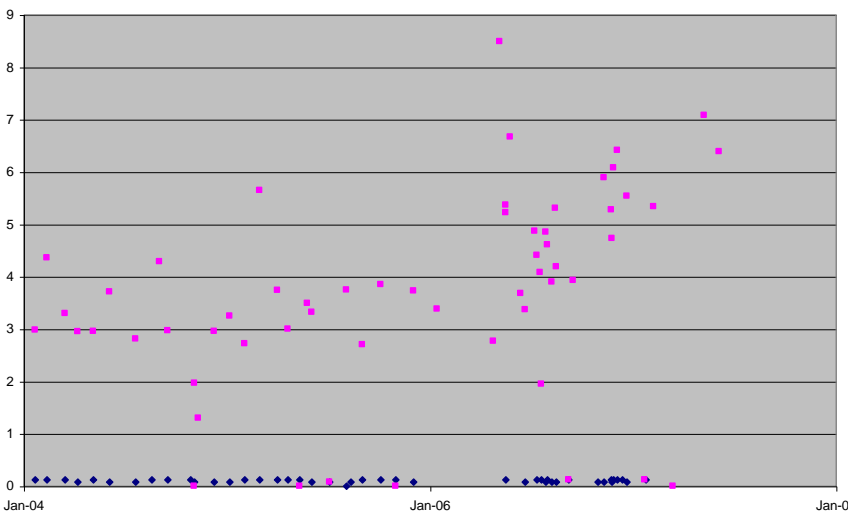


Figure B1 CHCs in Groundwater at BH1

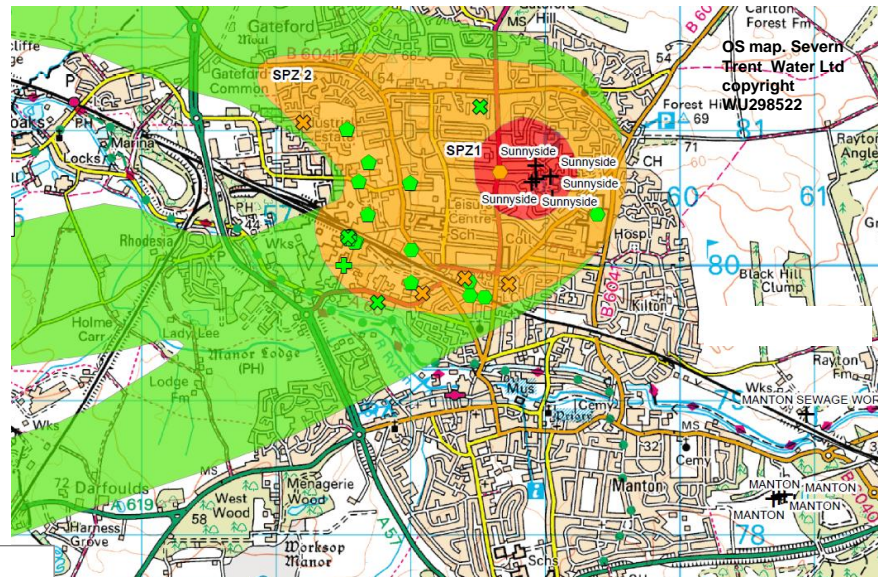
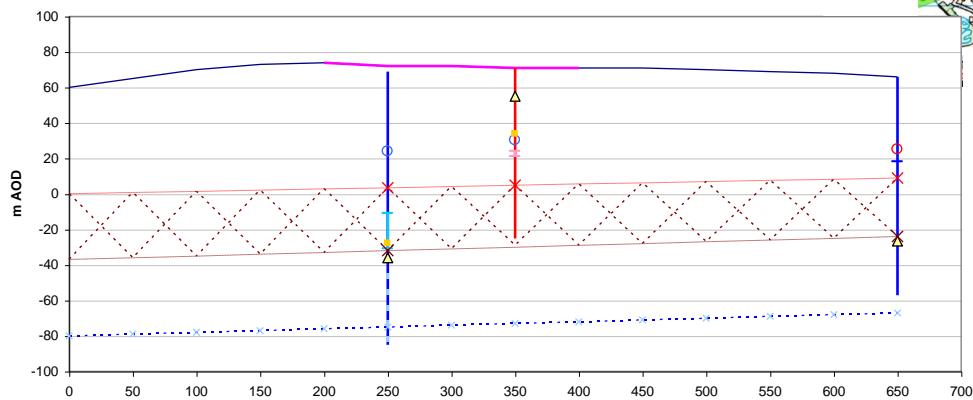


Examples of Urban Source quality

Terachloroethene [ug/l]



West to East .



Polluter pays principal

- Historic usage, no longer in business – who liable?
- Proof of liability
- Cost of treatment vs cost of investigation and legal costs
- As no significant environmental impact – no EA / Government funds, down to civil claim from water company (will this change with Article 7 of WFD?)

Alternative to treatment at abstraction point

- Opportunity to use other techniques rather than treat at point of abstraction?
- Cost of treatment
- Cost of investigation and remediation
- Risk – of not achieving drinking water standards at the point of abstraction

New Risks

- Redevelopment of old industrial sites
- Drilling of exploratory gas boreholes
- New development close to boreholes – crypto, SUDS
- Allotments!
- Will protection via planning drop with abolishment of regional planning strategy and EA funding cuts?

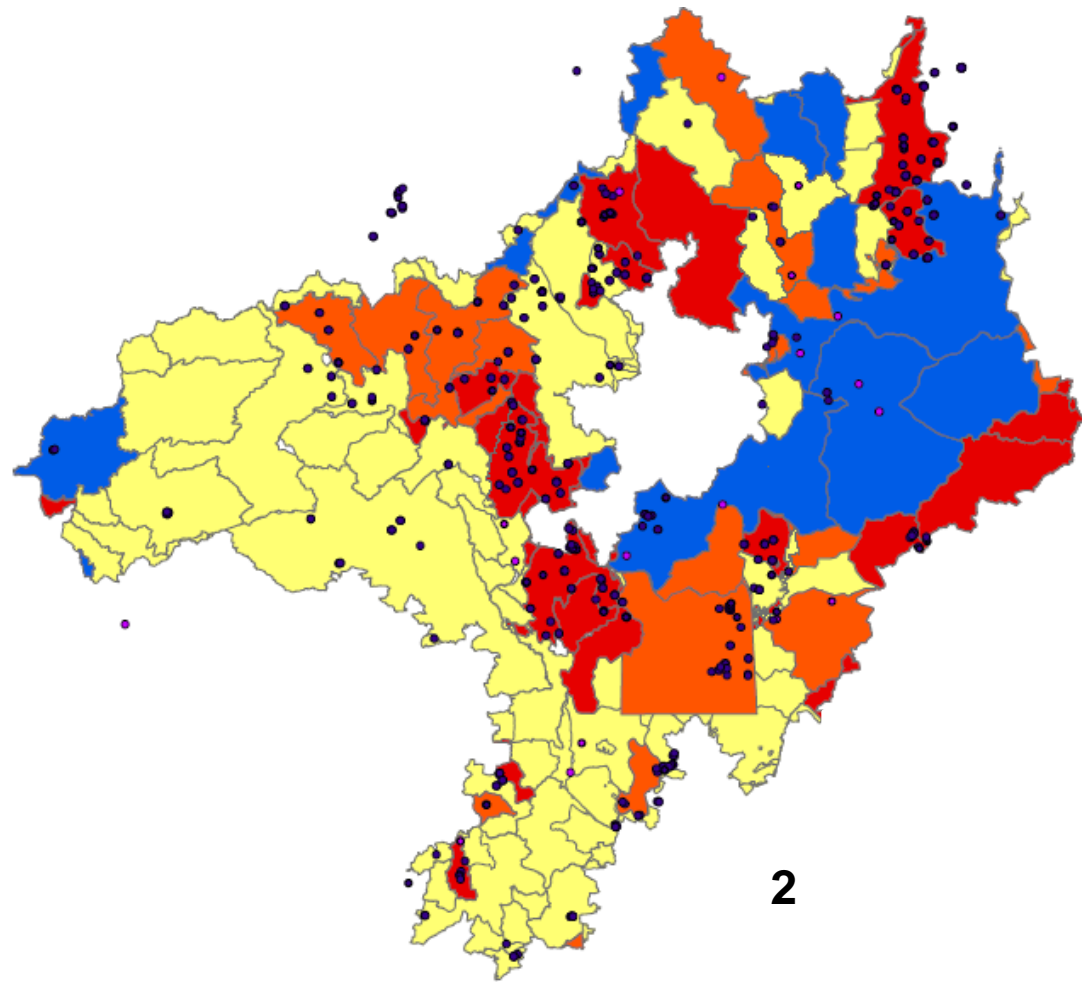
New Source Development

Blue	WA = Water Available for further abstraction
Yellow	NWA = No Water Available for further abstraction
Orange	OL = Over Licensed
Red	OA = Over Abstracted

EA CAMS
evaluations

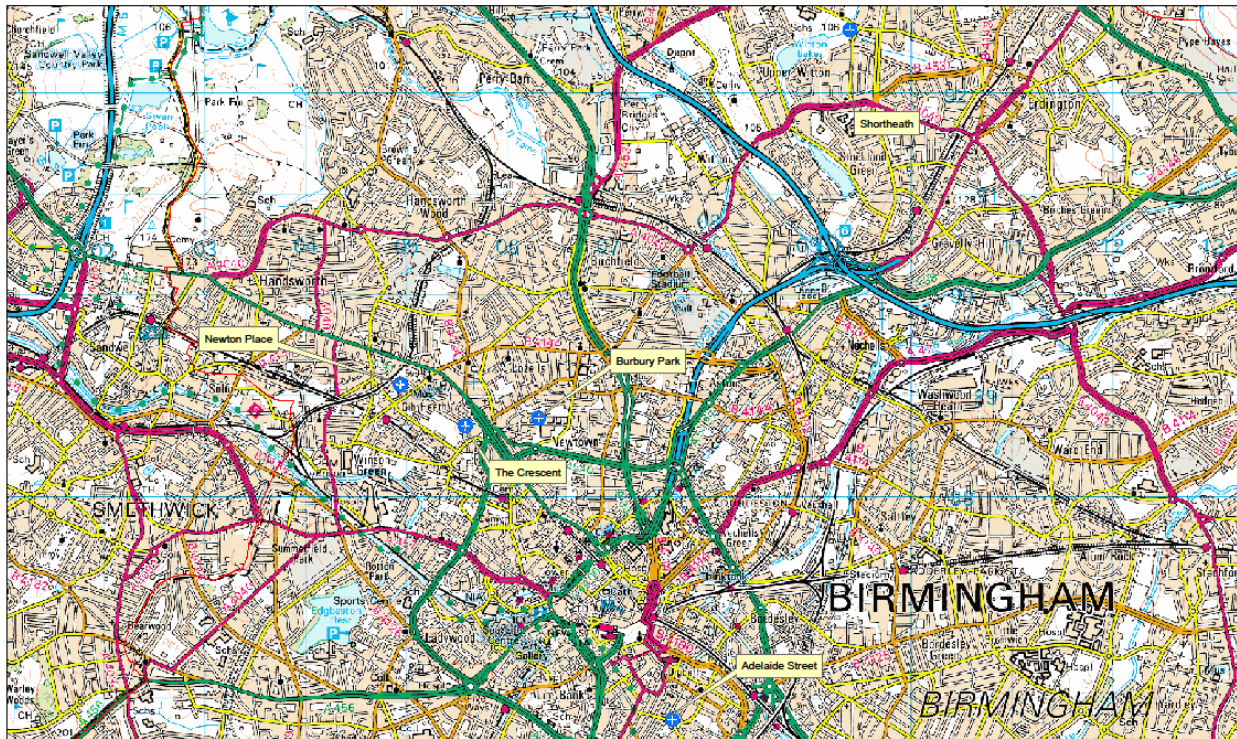
Where is
groundwater
available for
new supply....

.....urban areas



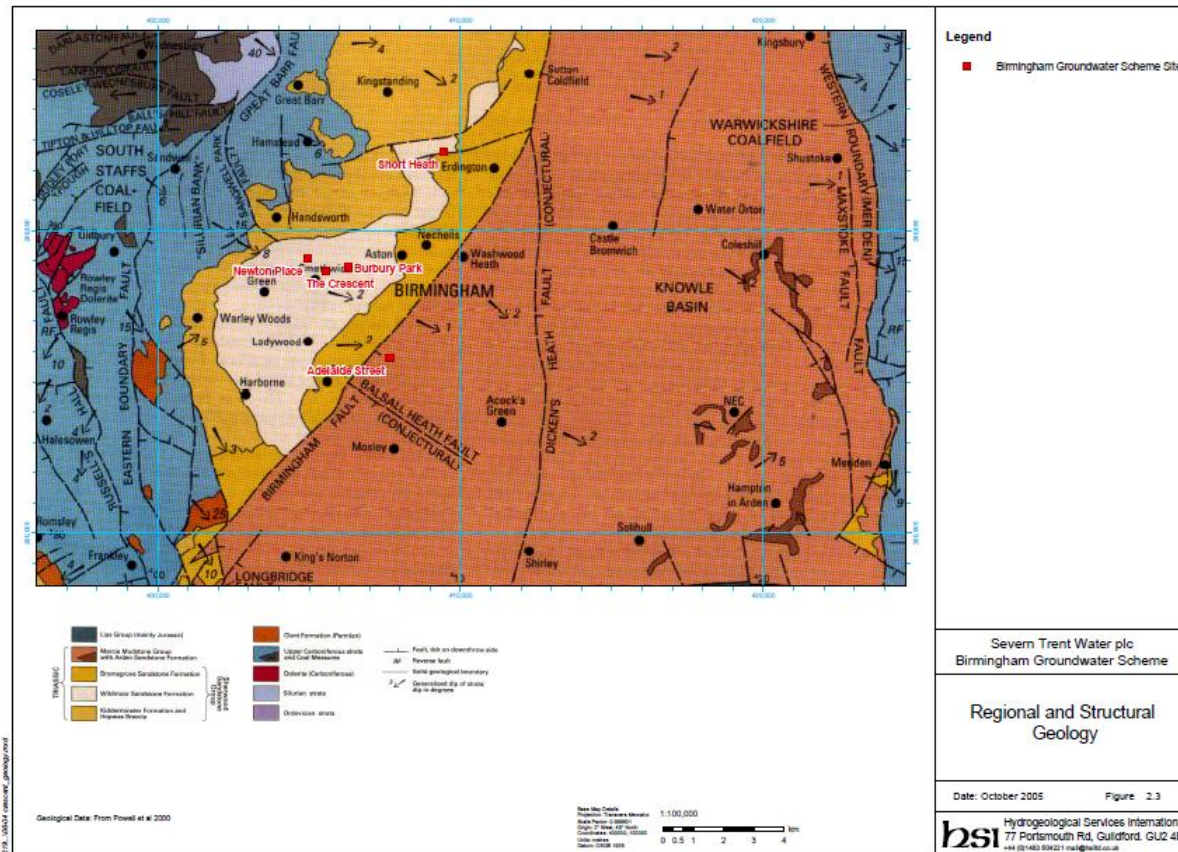
Experience of new sources in Birmingham

- River augmentation boreholes developed between ~2000 and 2009



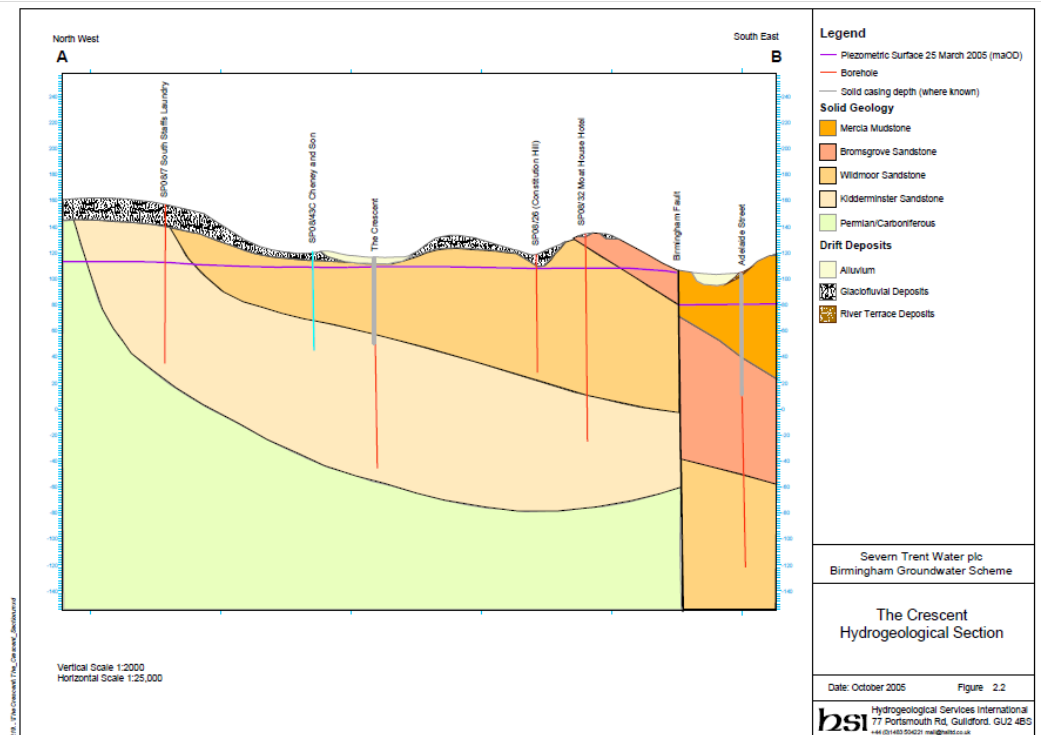
Birmingham geological setting

- Brown field sites identified, mostly on unconfined Sherwood Sandstone



Pilot borehole testing and final BH design

- Pilot borehole drilling and testing
- Two aquifer horizons of differing water quality identified



Birmingham BHs quality results and future risks



Shallow aquifer

- High conductivity (1200uS/cm)
- Acidic pH (6.5)
- High NO3 (100mg/l)
- Elevated major ions (SO4, Mg)
- Elevated metals (Ba, Cu, Pb, Ni, Cr)
- Trichloroethene (42ug/l)

Deep aquifer

- Water quality more typical of natural aquifer
- Conductivity (450uS/cm)
- NO3 (30mg/l)
- Trichloroethene (2ug/l)

Uses geological structural, hydraulic and natural attenuation properties to maximise protection of the water quality of the new sources

Planned New PWS sources

- Some of river augmentation BHs to be developed for public water supply
- Development of one new urban source
- Further quality risks – implications for treatment costs?
- ASR schemes, but in confined areas.....

Summary



- Historical pollution a problem, some sources only now being significantly impacted
- Customers pay for treatment, or undertake further investigation to pursue civil claim
- Reliable cost effective options of in-situ remediation, cost and risk
- Exploit hydrogeological protection in the design of new urban sources, uncertainty in quality over time
- Changes to planning policy and government funding, potential increased risk to drinking water supply sources

Contributions from



- (HSI) – Scott Wilson
- Grontmij
- MWH
- Matt Hudson
- Rick Ireland (Aquarite)
- Environment Agency
- Others.....

Many thanks