British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Weather systems to boreholes: the challenges of representing groundwater impacts in the changing water cycle

BGS: Bricker, Jackson, ***Hughes*** and Peach

27th June 2012

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Order

- (brief) Re-cap of what we want to do
- Summary of groundwater issues
- Challenges
- Possible solutions

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Order

- ***(brief) Re-cap of what we want to do***
- Summary of groundwater issues
- Challenges
- Possible solutions

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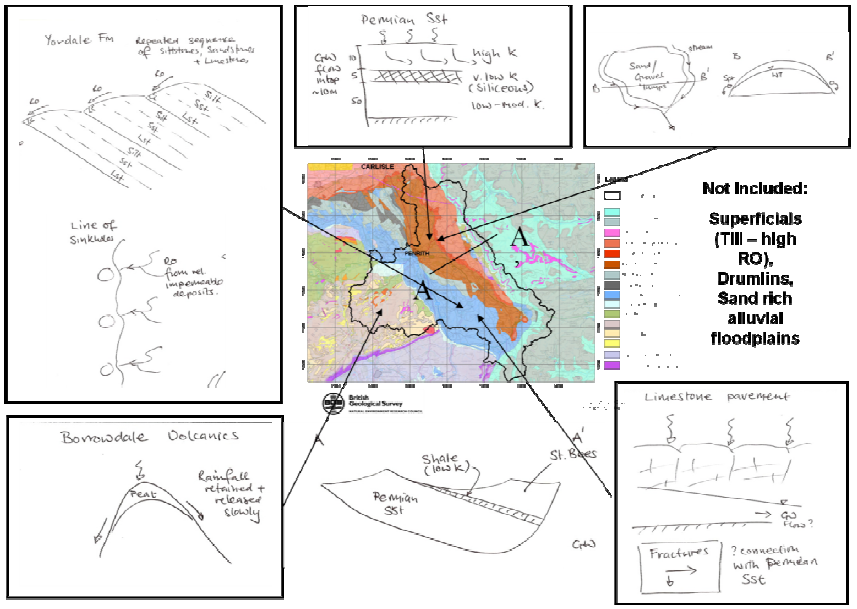
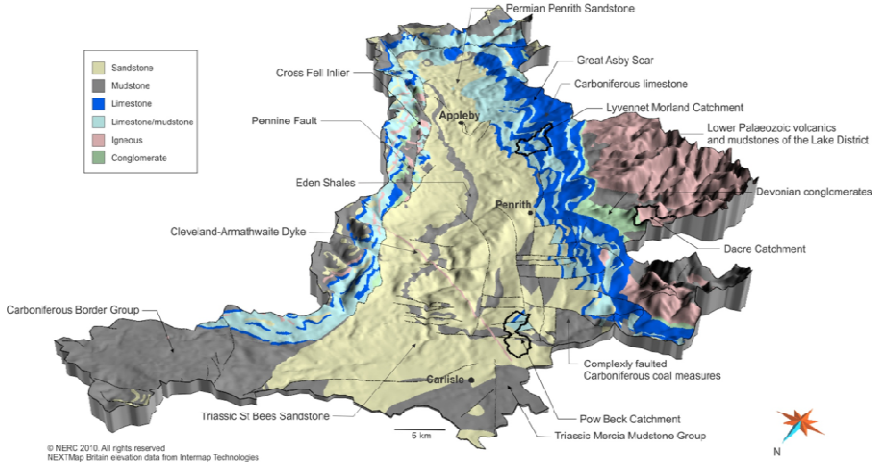
HydEF – Eden Valley

- Geological understanding: Catchment scale, Lazonby Gorge and granulation seams
- Hydrogeological understanding – DTC
- Project-based: conceptualisation





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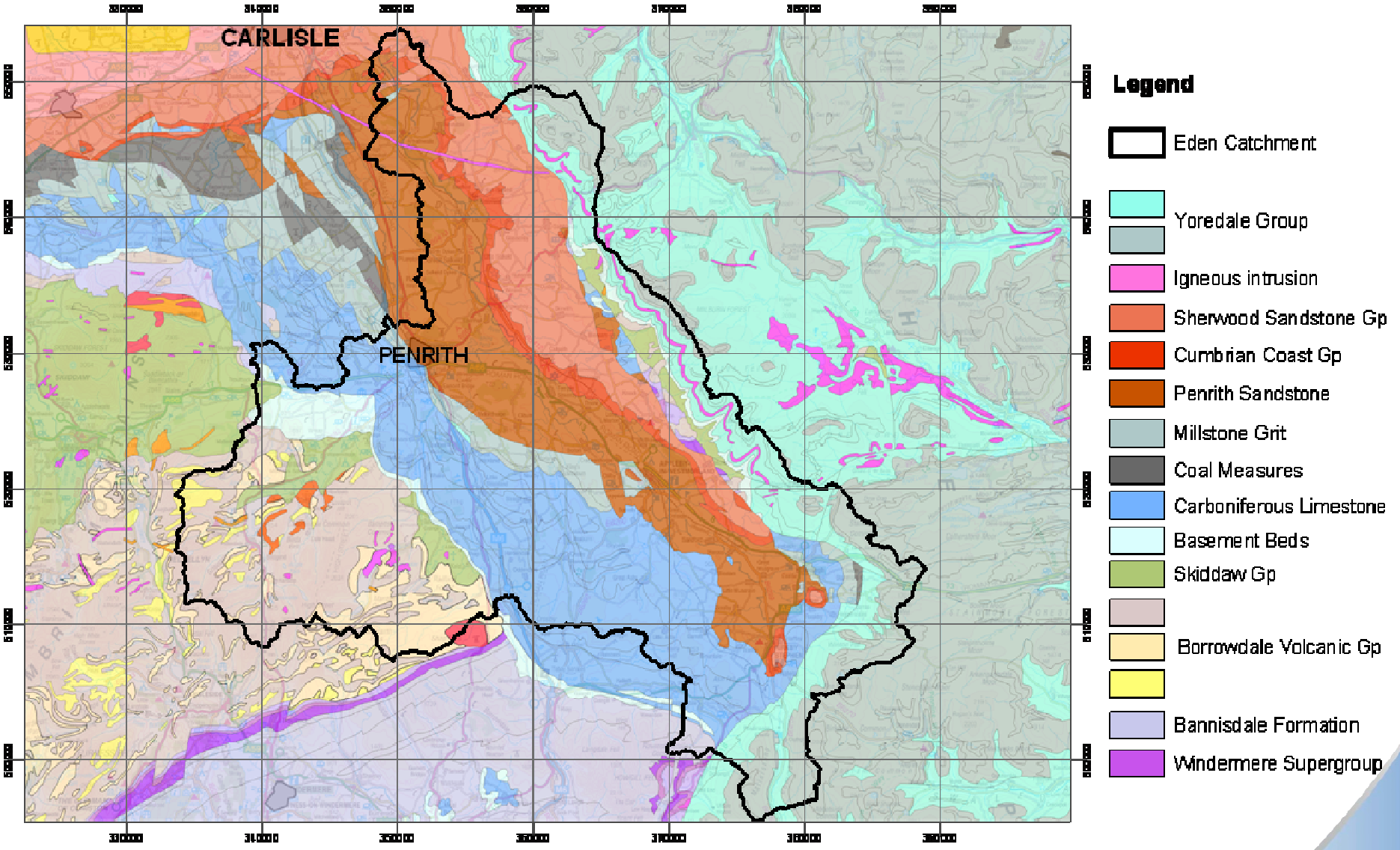

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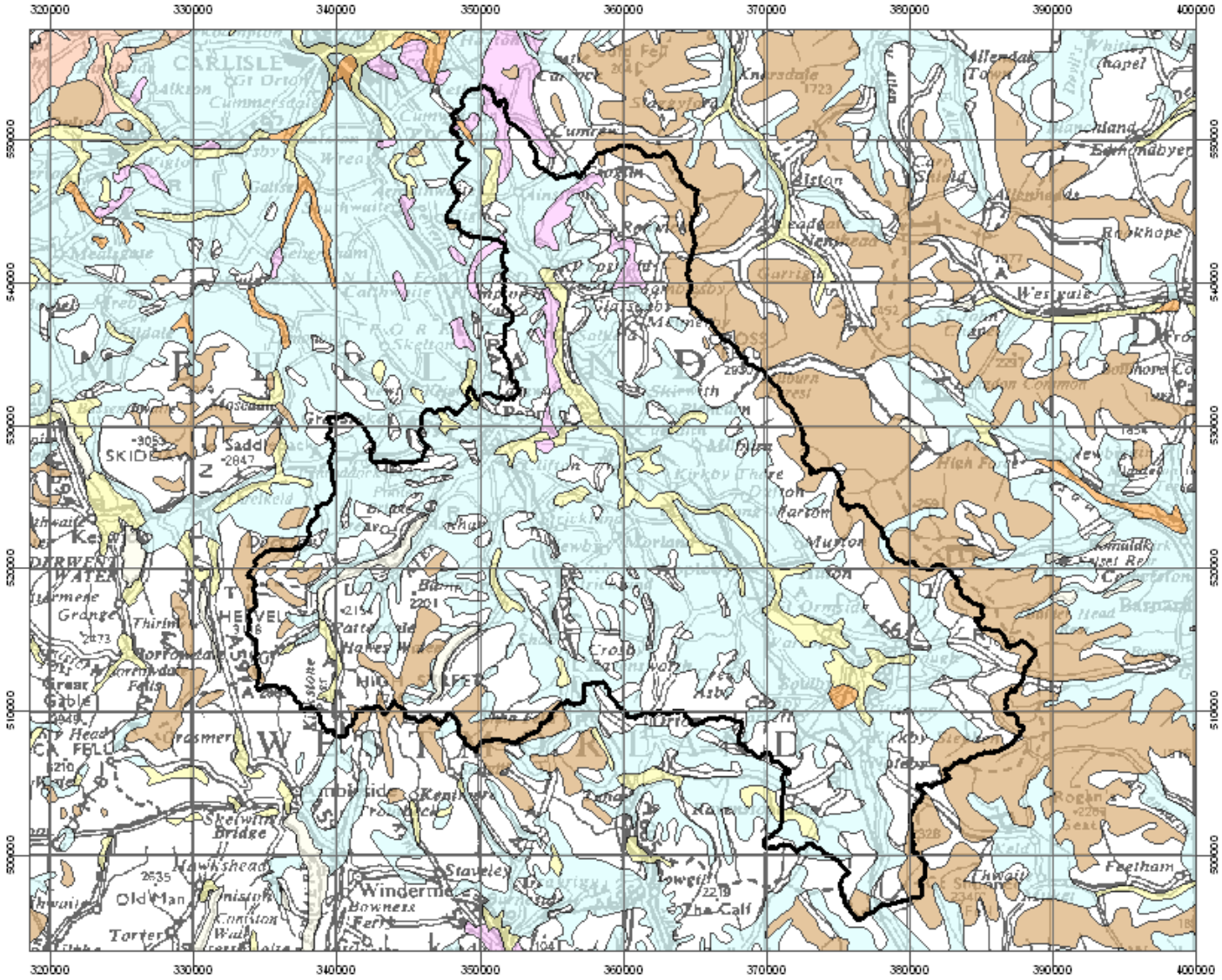

Superficial deposits within the Eden Catchment

Legend

- Eden Catchment
- Alluvium
- Glacial Sand and Gravel
- Peat
- Raised marine deposits (Sand and gravel)
- River Terrace Deposits (Sand and gravel)
- Till
- Unknown

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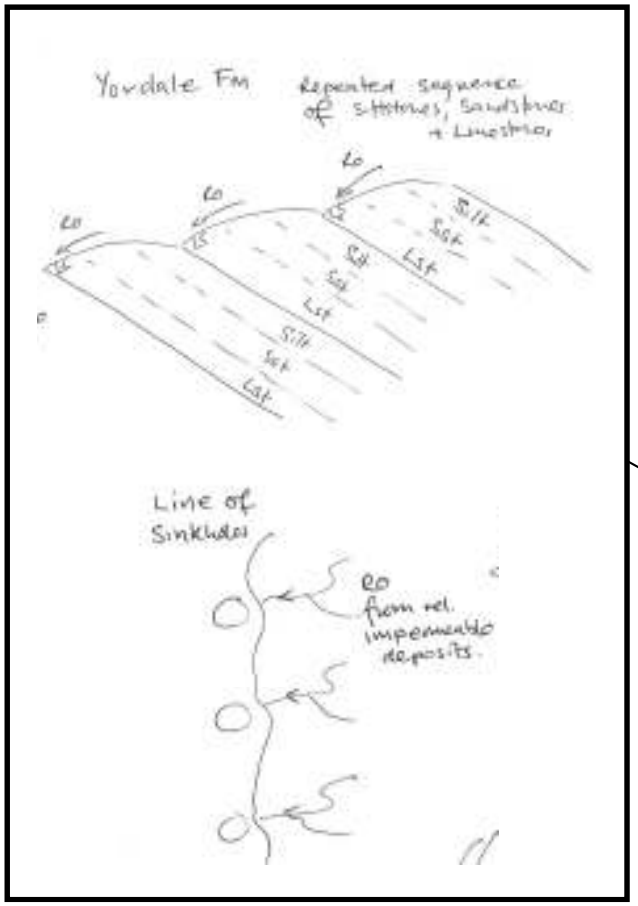
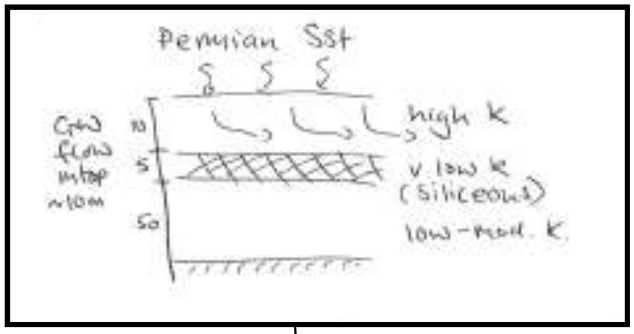
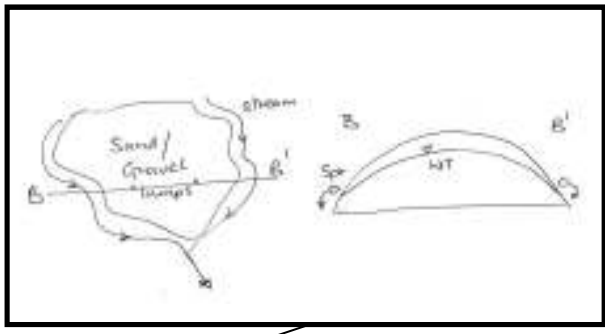
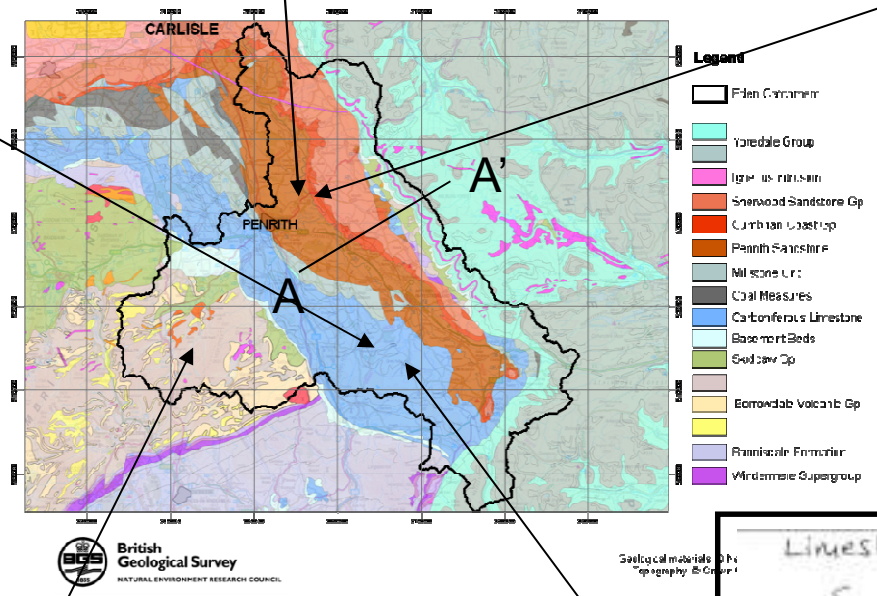


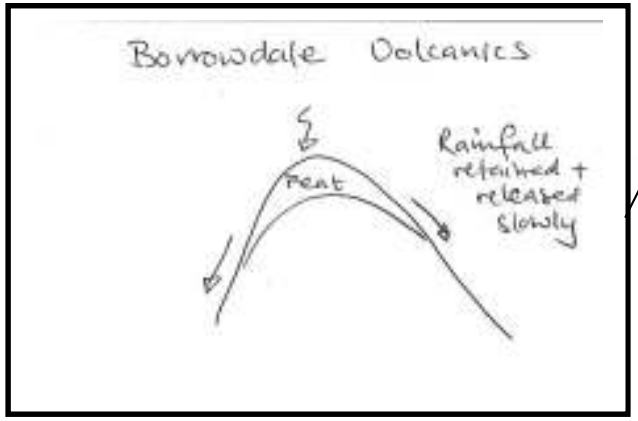


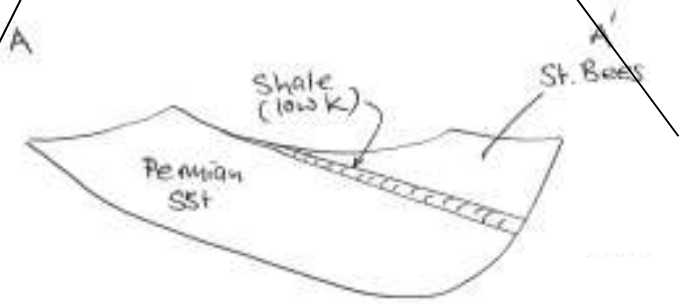


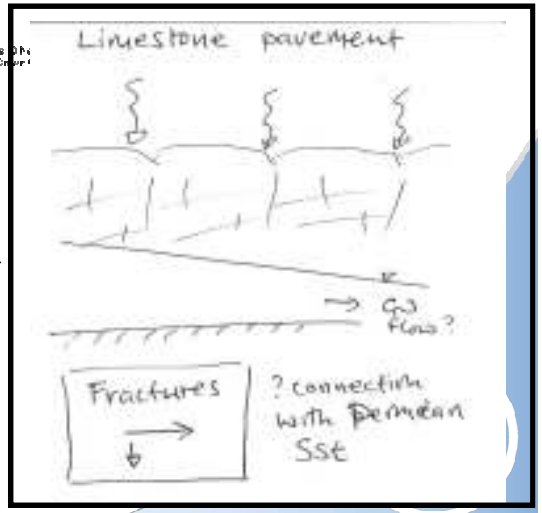


Not included:

Superficials (Till – high RO), Drumlins, Sand rich alluvial floodplains







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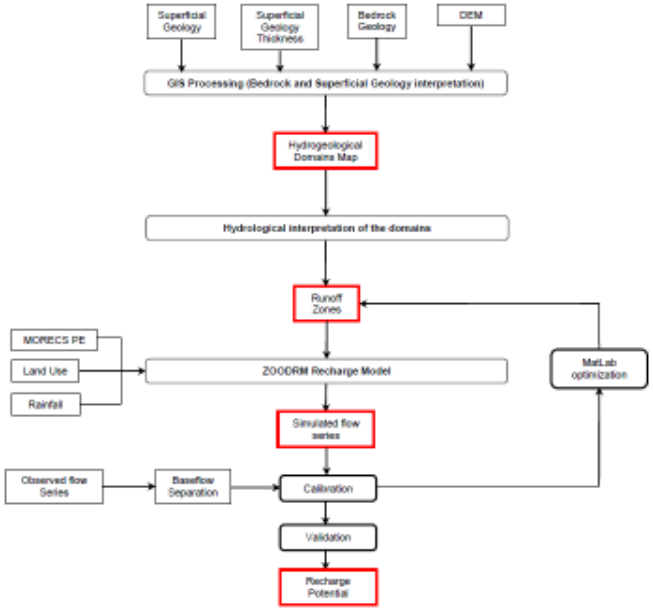

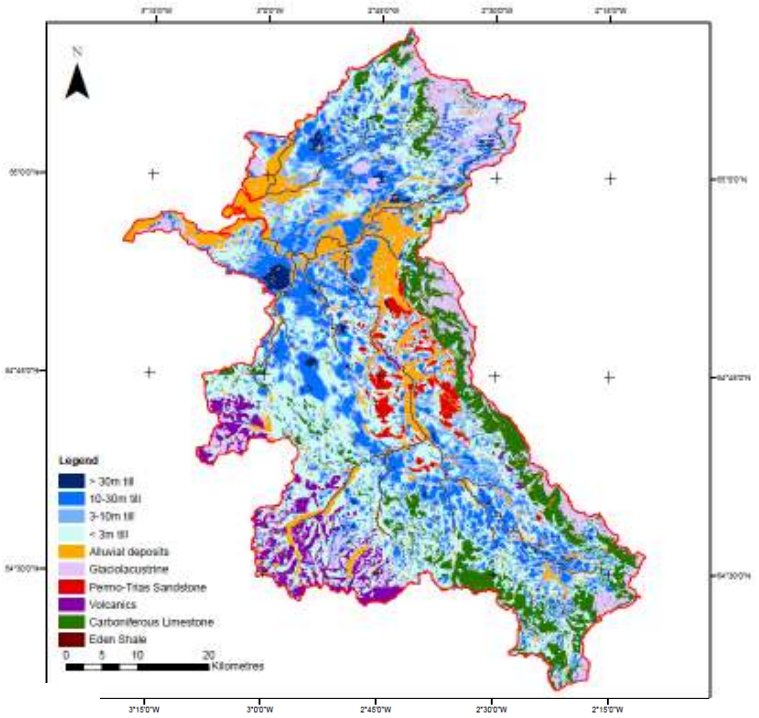

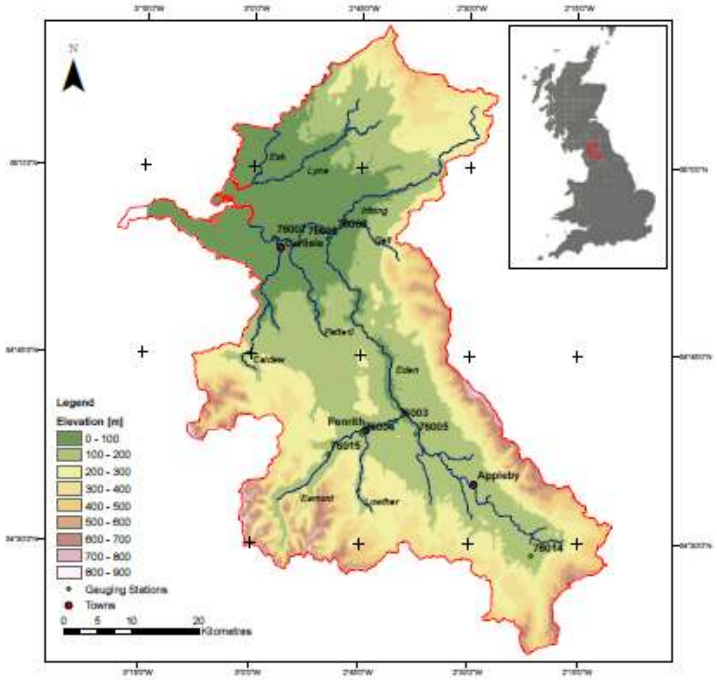

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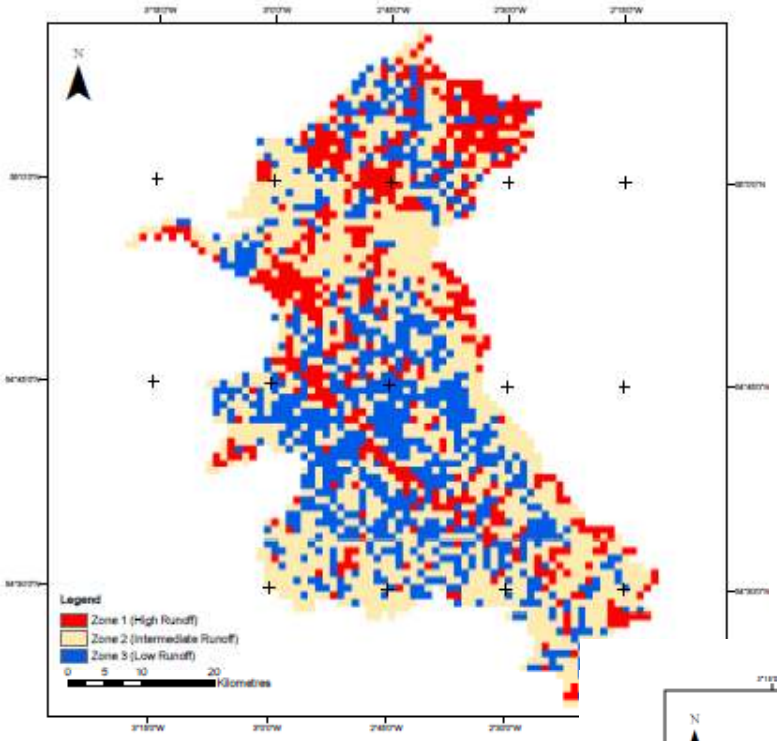

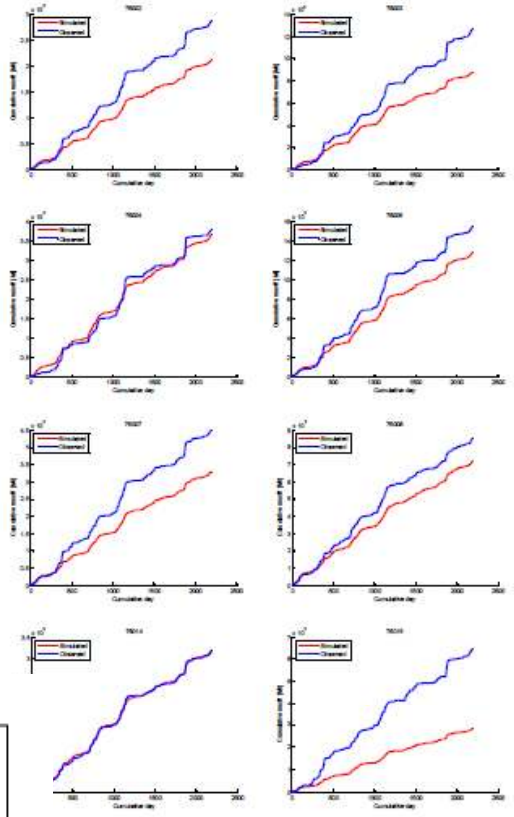

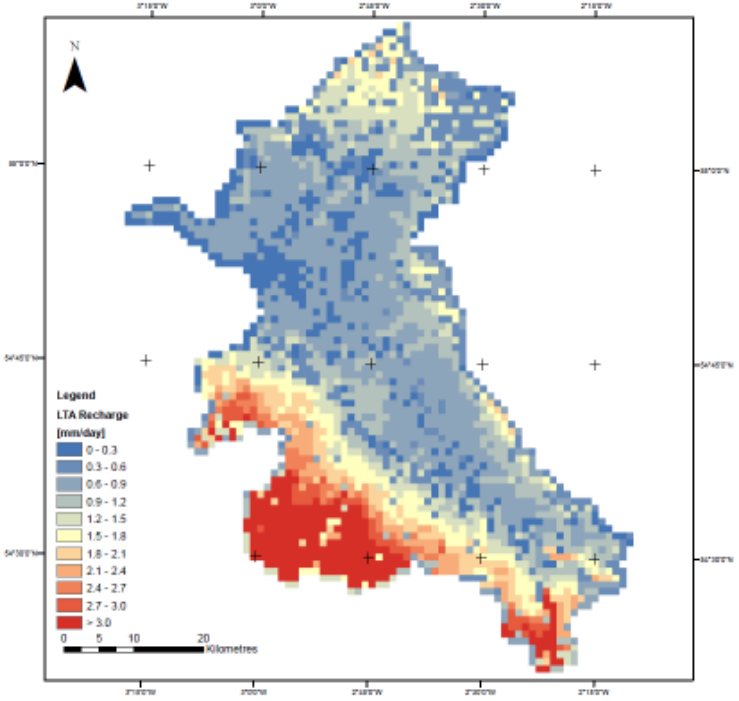

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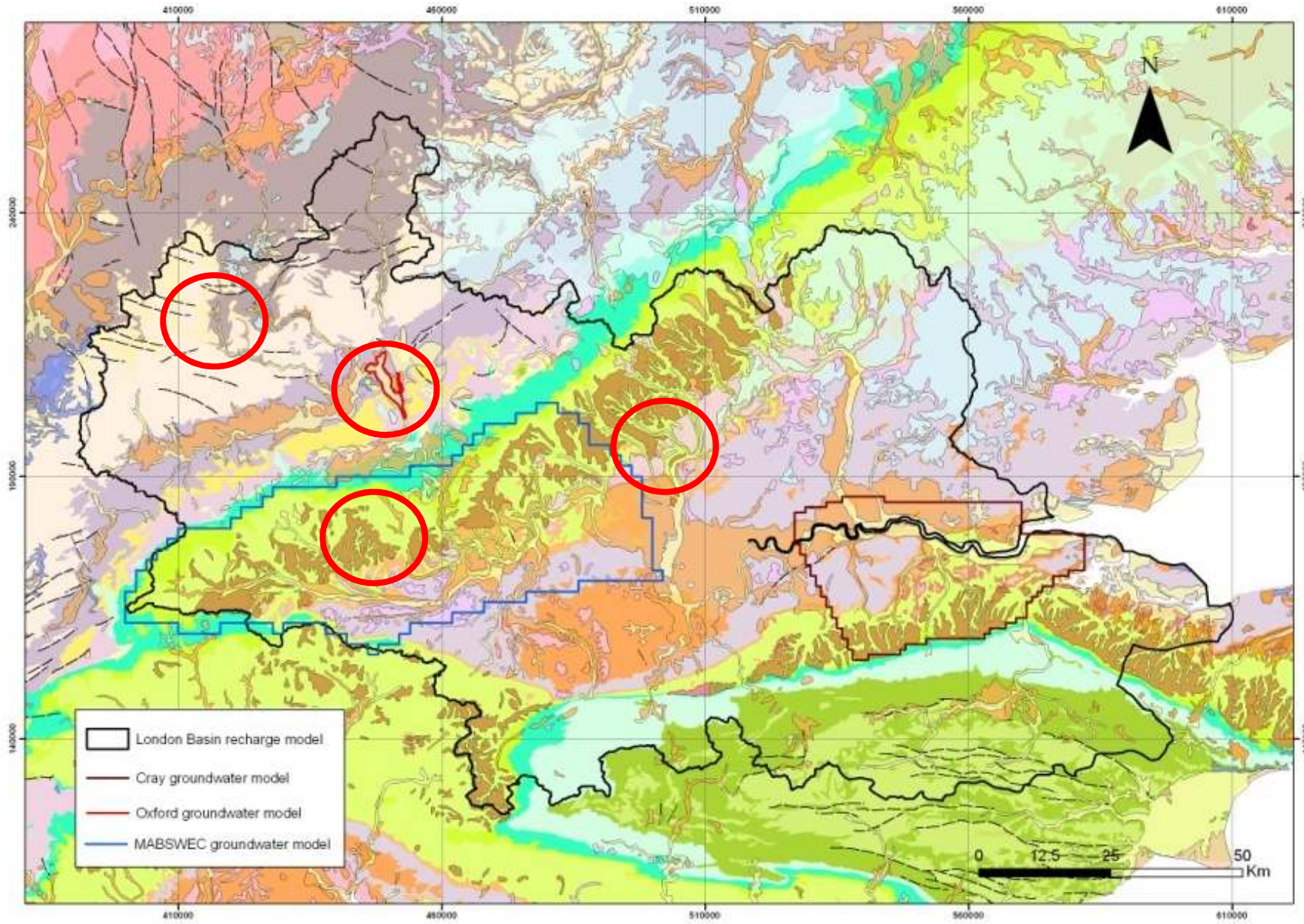

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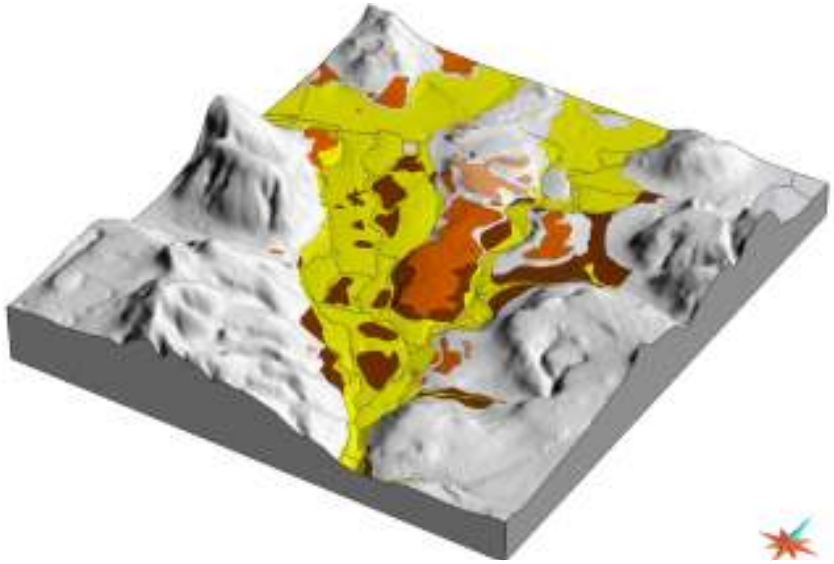
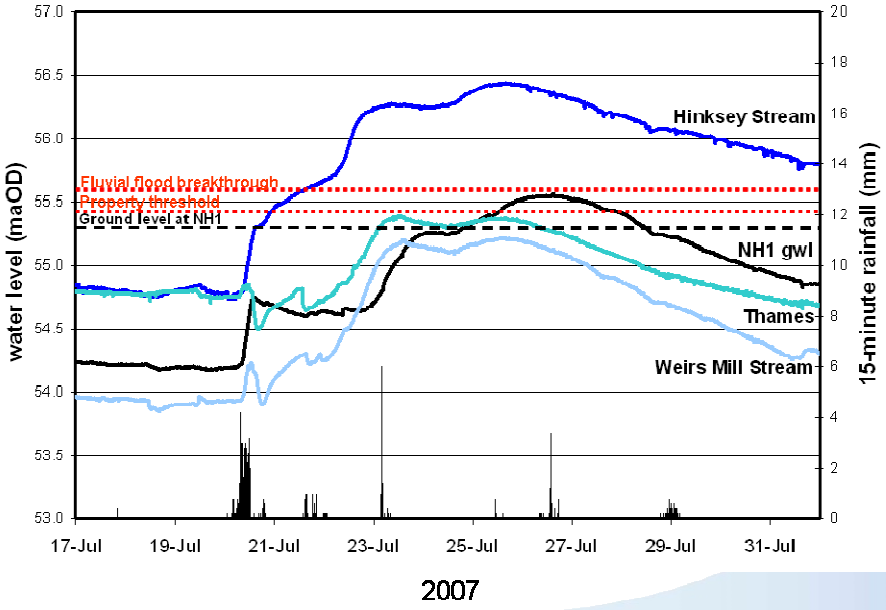
HydEF – Oxford



- Model composition under development
- BGS now has RS Infoworks licence for 1 years and model files
- Linked model only north of Botley Road
- Issue over representation of flood plain storage



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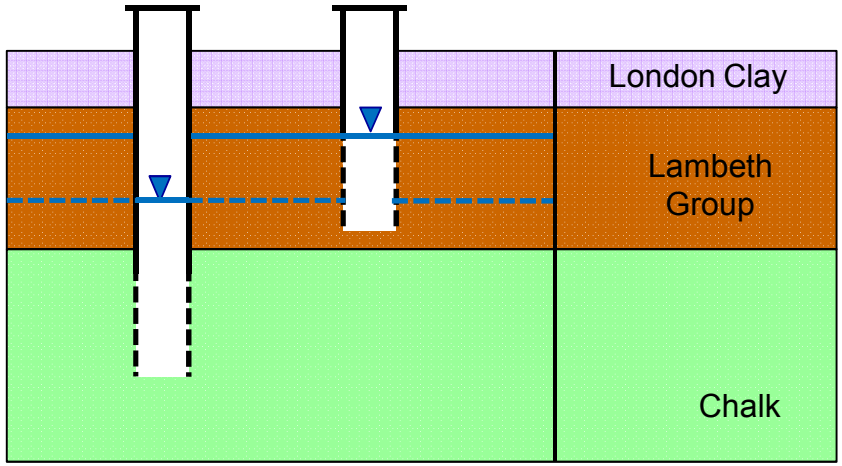
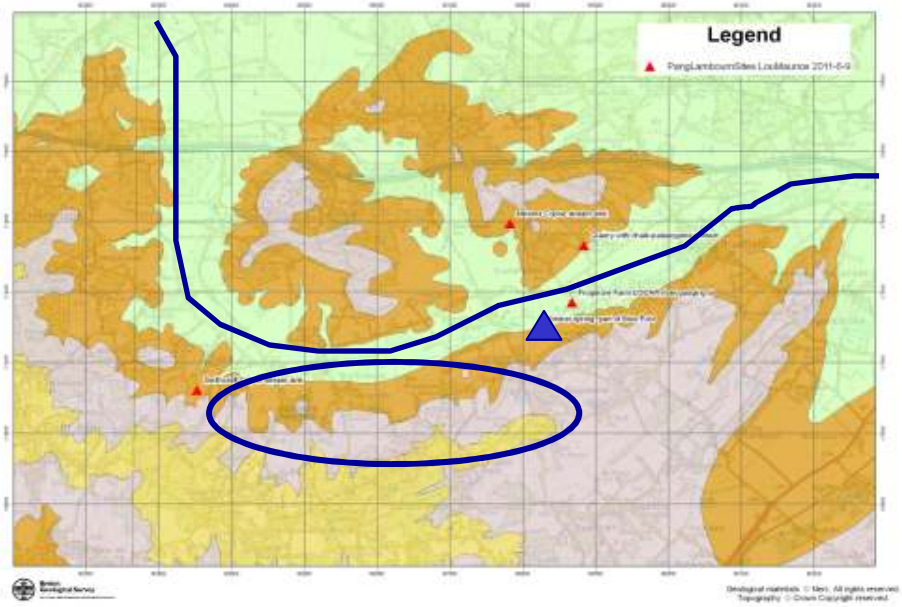
HyDEF – Understanding the hydrogeology

Pang - Lambourn

Drilling project (BGS funded)

- To assess the contribution of the Palaeogene deposits to the Blue Pool
- Two boreholes side by side (one chalk, one Palaeogene)





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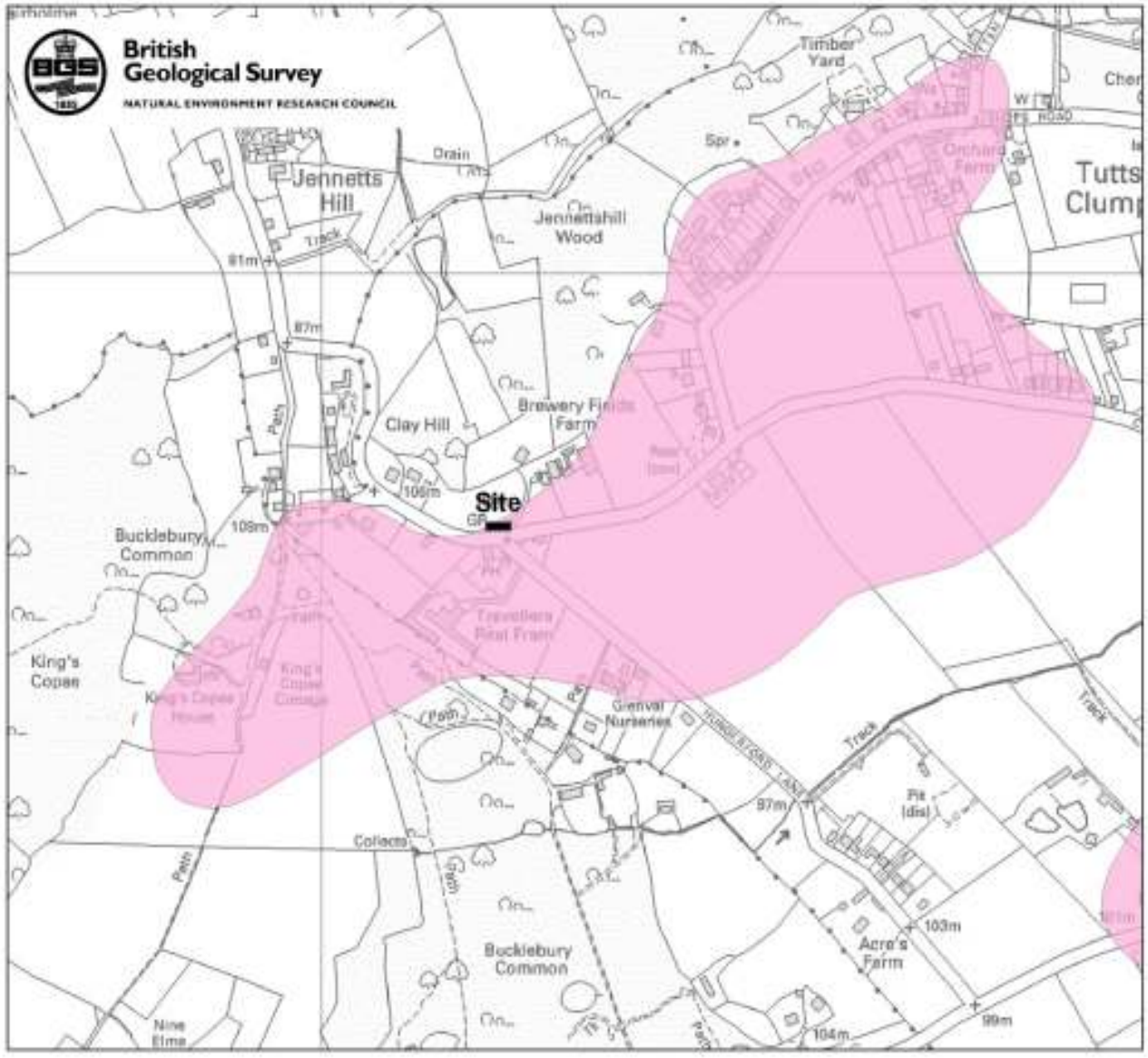

Legend

Geology 50k superficial

Beenham Stocks Gravel

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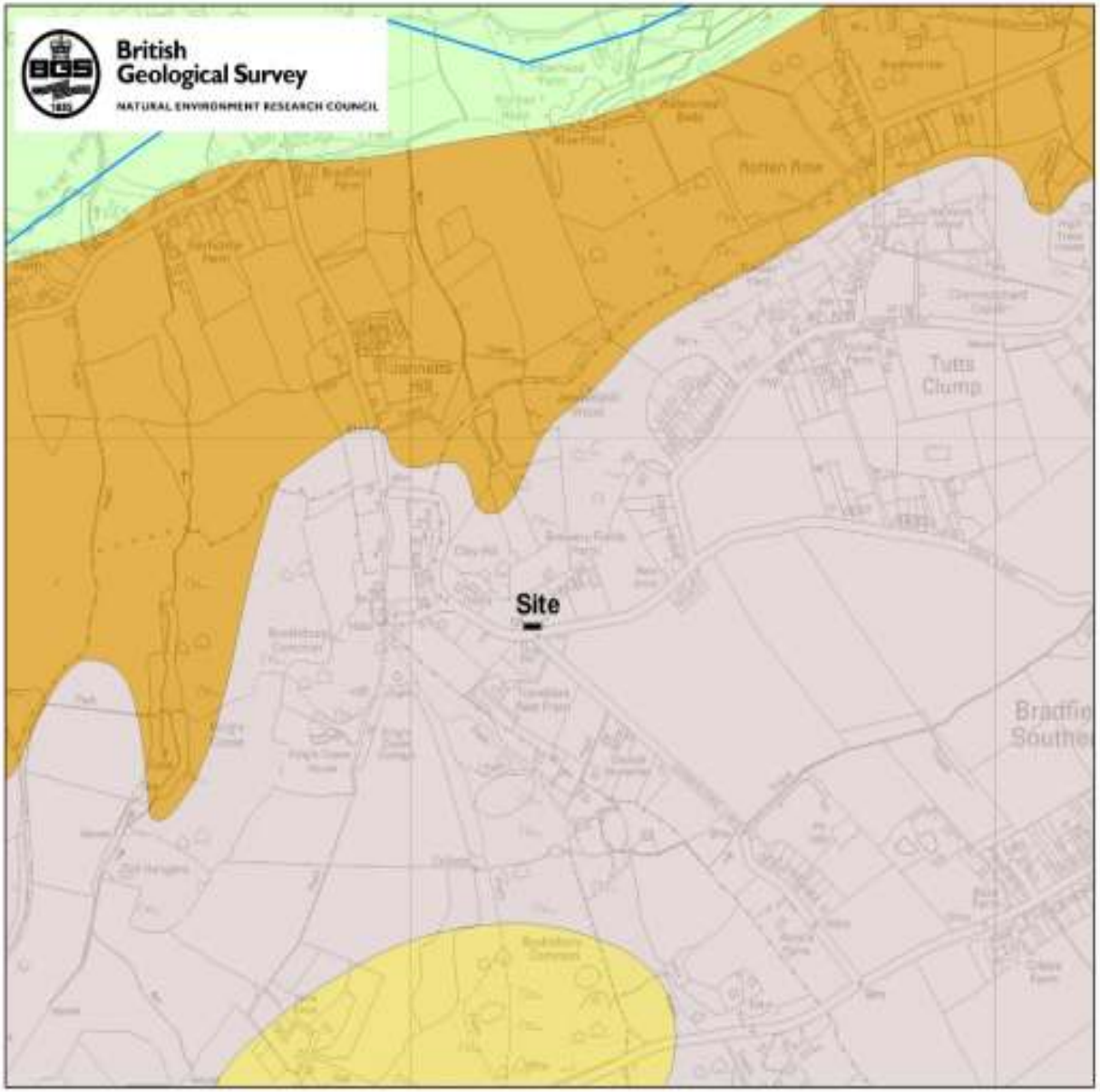

Legend

Geology 50k bedrock

- Bagshot Formation
- London Clay Formation
- Lambeth Group
- Chalk Group

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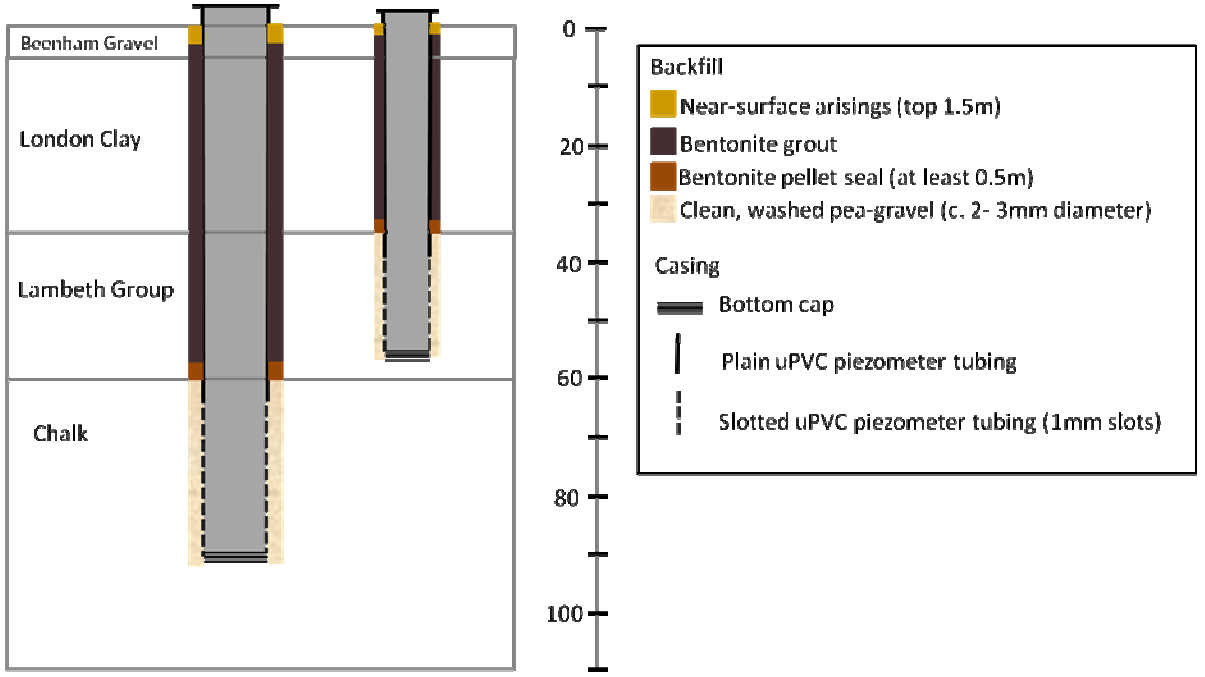

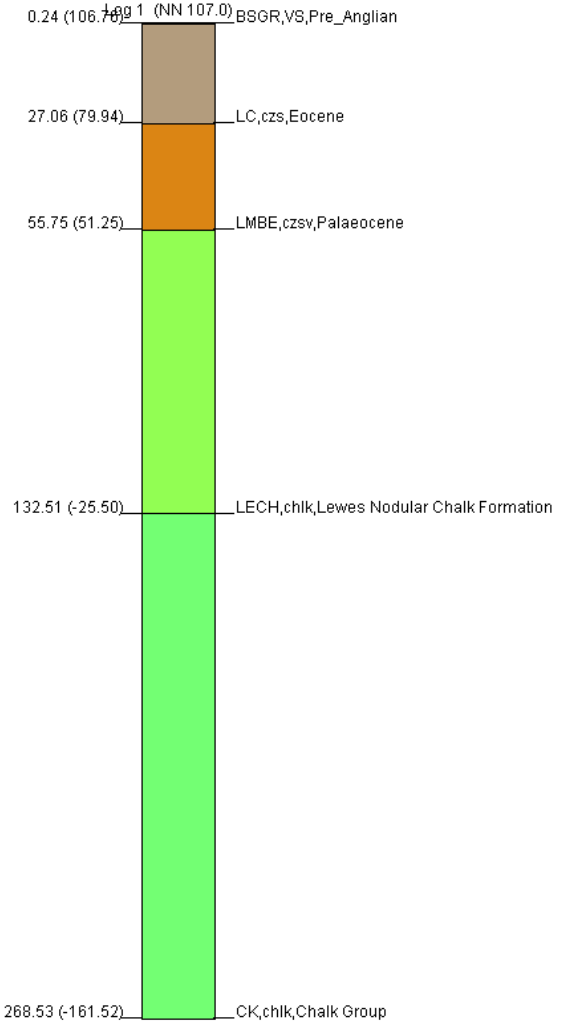

Surface completion:
The surface completion shall comprise the uppermost piece of surface casing used to support the completed borehole and to provide protection for the piezometer. The casing shall be left protruding between 0.5 m and 1 m above ground surface and shall be completed by a lockable cap or flange on top. The piezometer shall be completed above ground but below the top cap or flange. The casing shall be cemented into the ground to avoid the possible ingress of surface water to the borehole.

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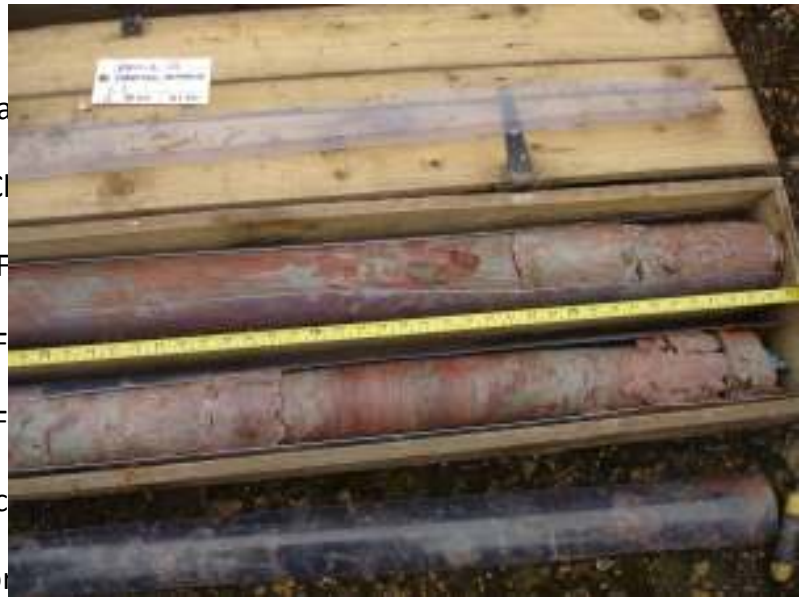
STANFORD
DINGLEY
TUTTS
CLUMP
COCK LANE
DANDO



0.24 (106.76)

27.06 (79.94)

55.75 (51.25)

132.51 (-25.50)

LECH,chlk,Lewes Nodular Chalk Formation

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57.10 – 58.98 Upnor For

58.98 - Chalk

268.53 (-161.52

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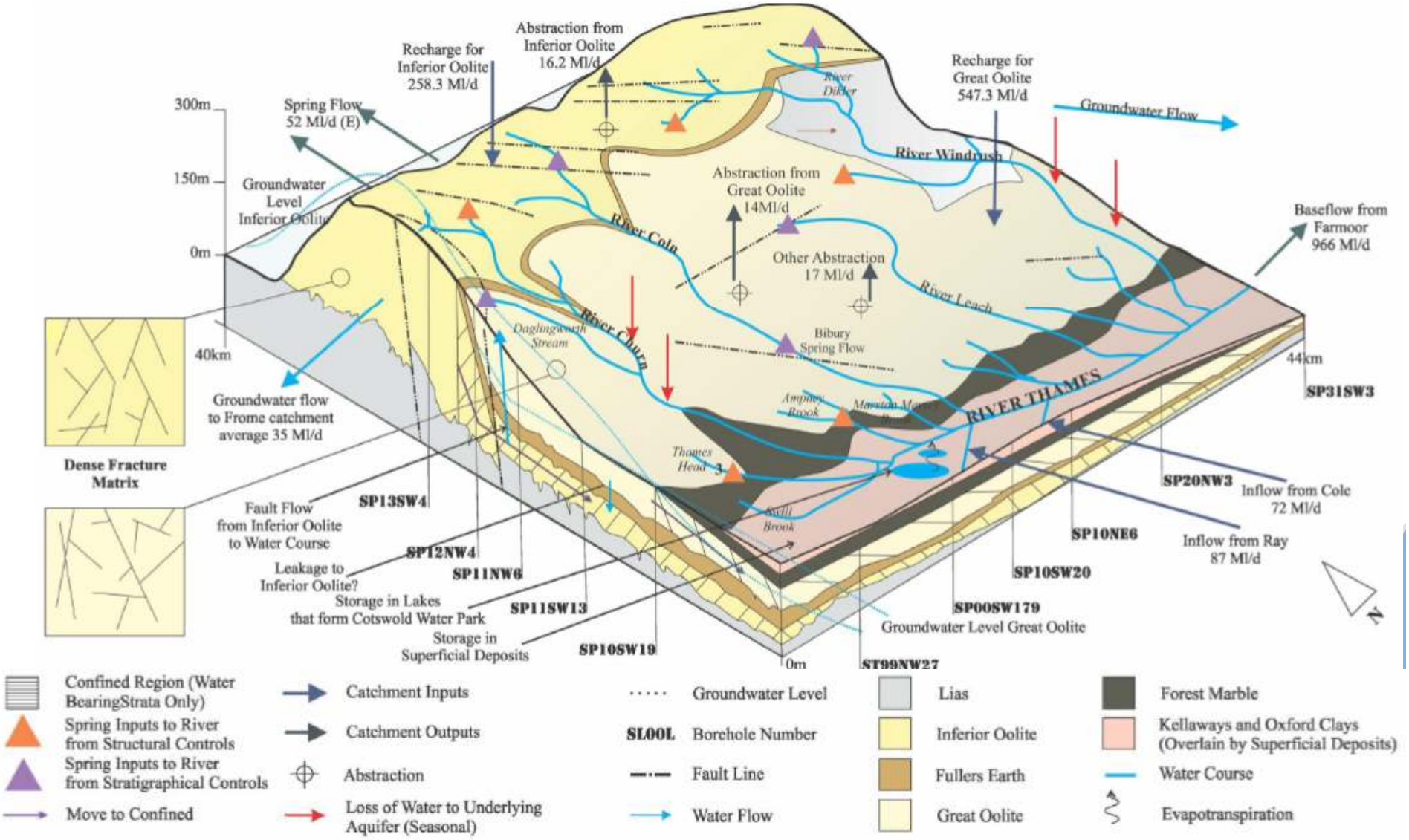
HydEF – Understanding the hydrogeology

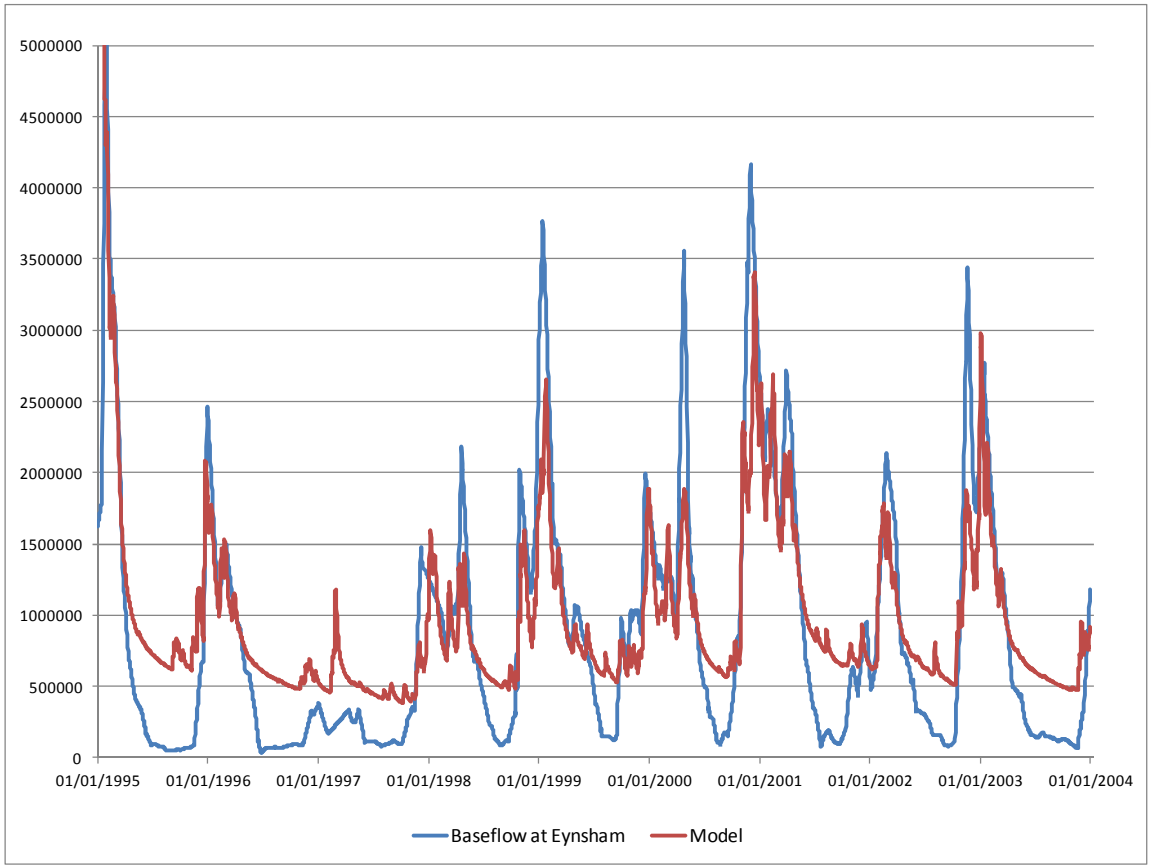
Cotswolds

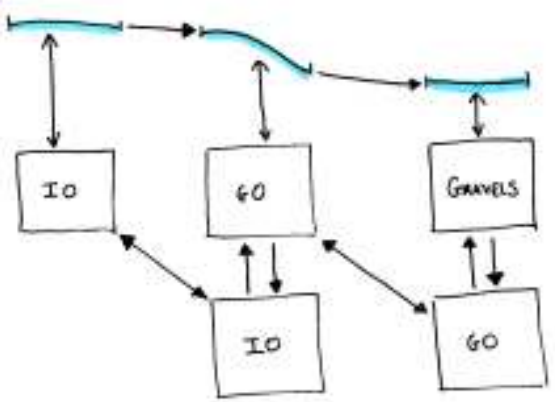
MSc Project - hydro conceptualisation and neural networks (Katy James – Cardiff Uni)



HydEF – Cotswolds groundwater modelling

- Developing semi-distributed model of aquifer system.
- Will be incorporated into multi-aquifer model of Thames catchment.
- OpenMI compliant code almost complete.





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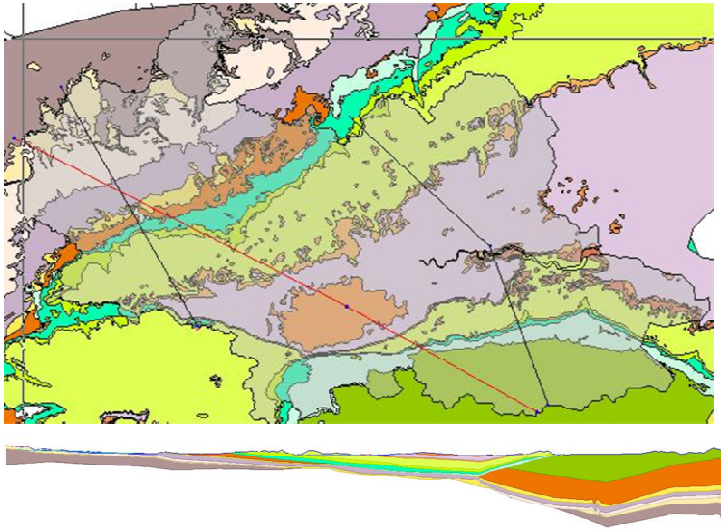

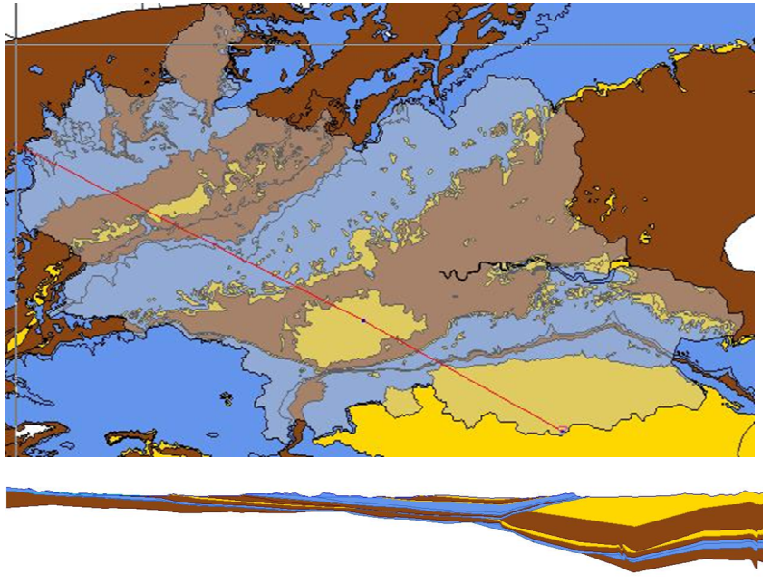

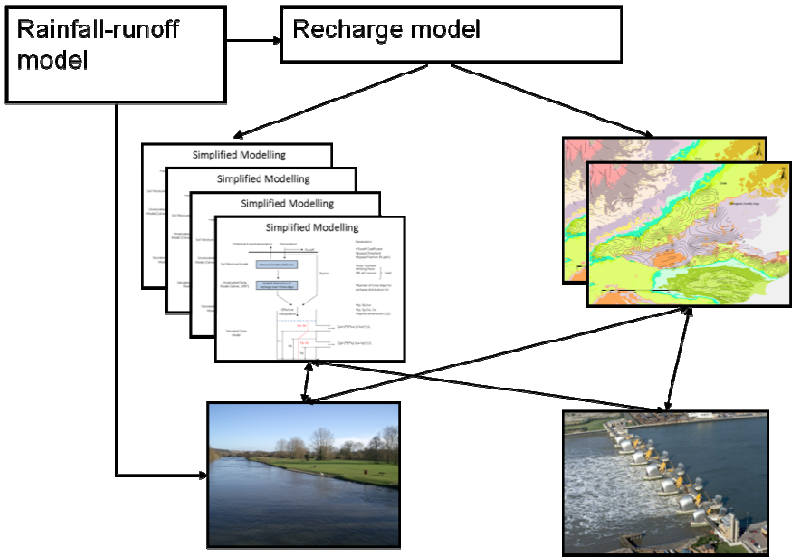

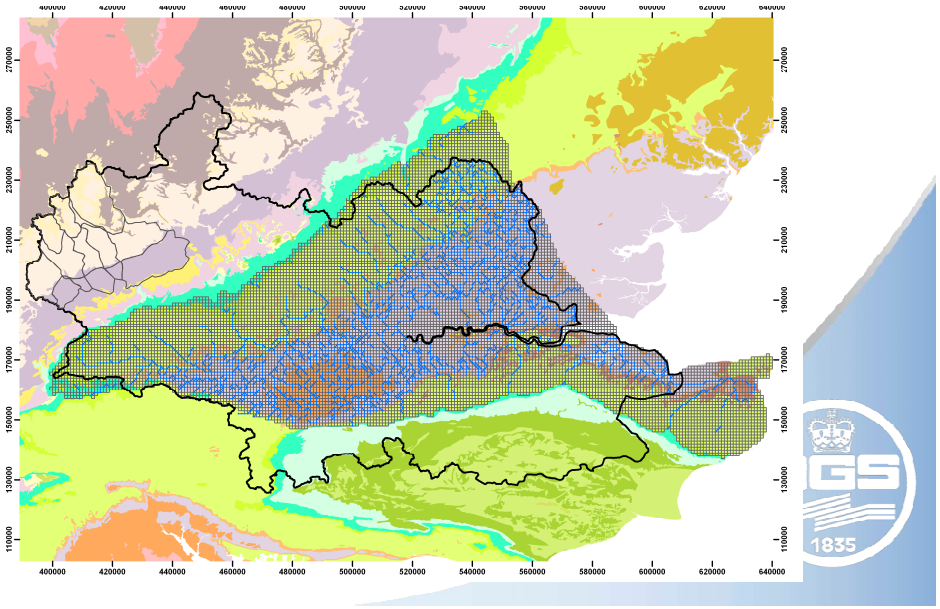

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Order

- (brief) Re-cap of what we want to do
- ***Summary of groundwater issues***
- Challenges
- Possible solutions

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River reach

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Springs

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Boreholes

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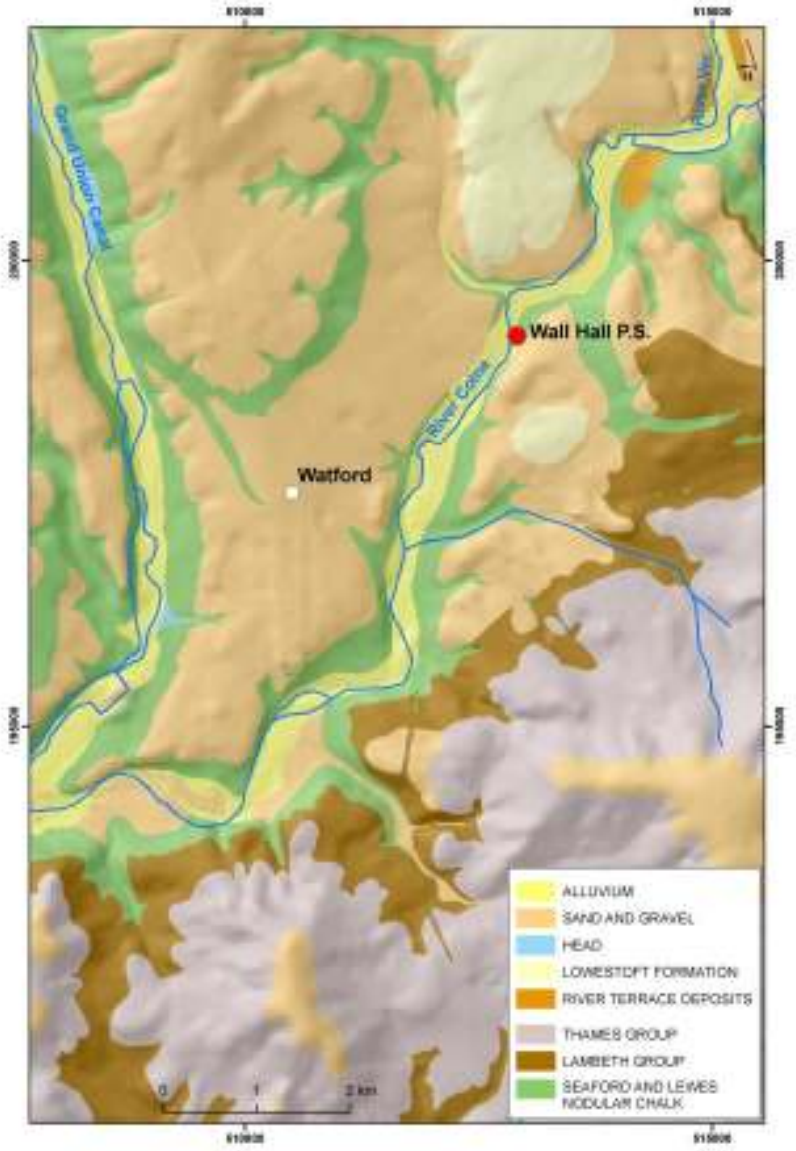
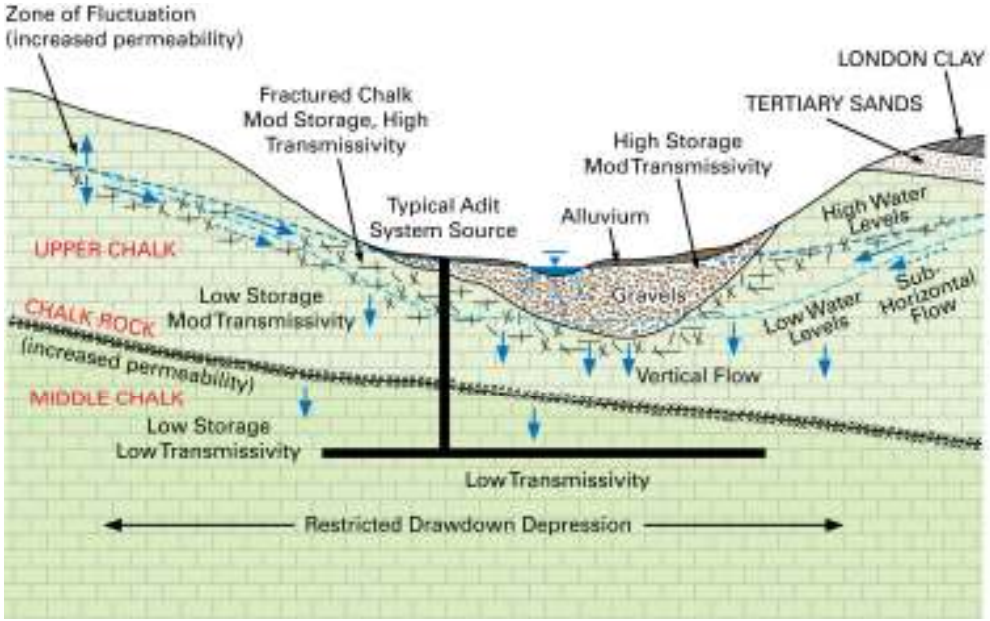
Adits





Note alluvium, sands and gravel, and river terrace deposits

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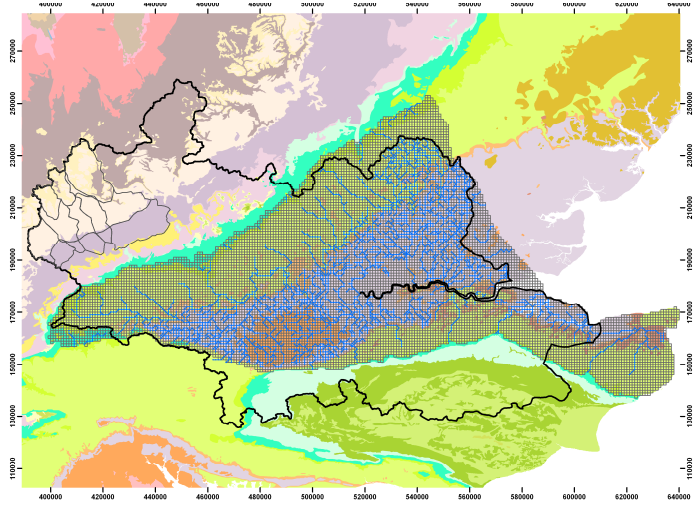
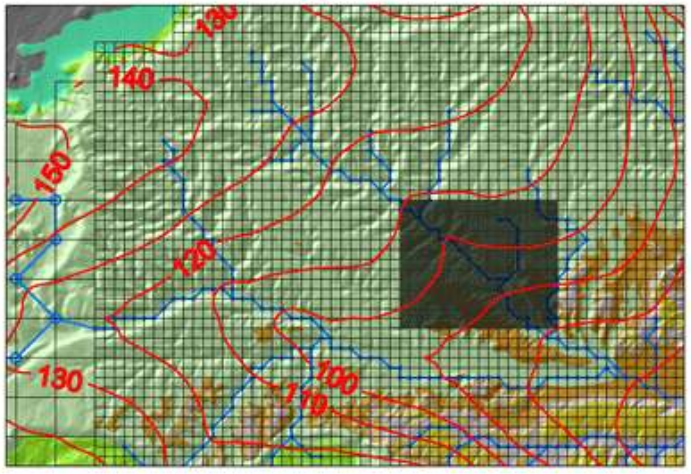
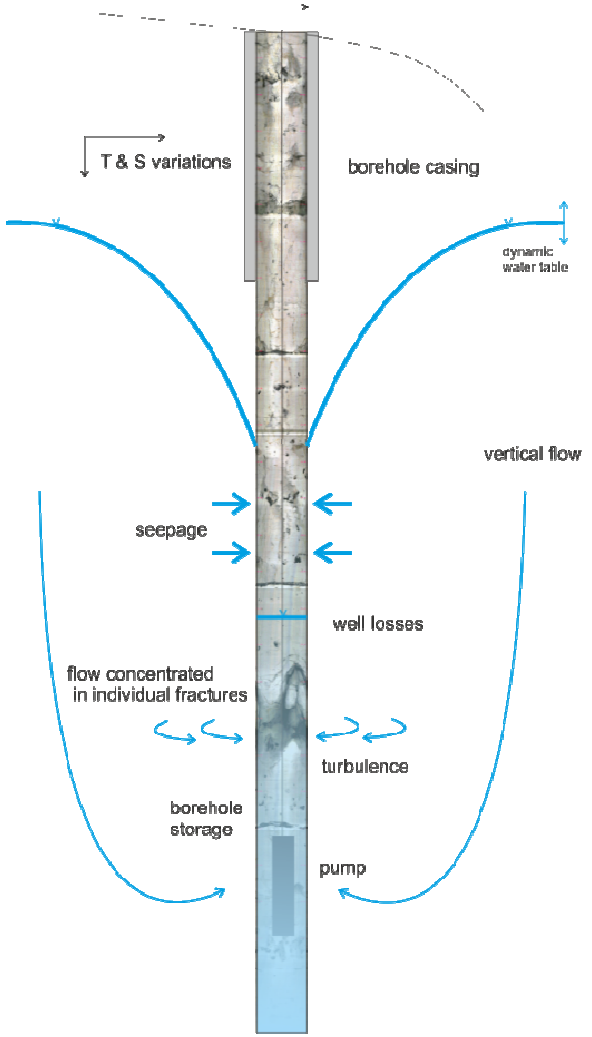
Spatial scales



Basin Scale



Regional Scale



Local Scale

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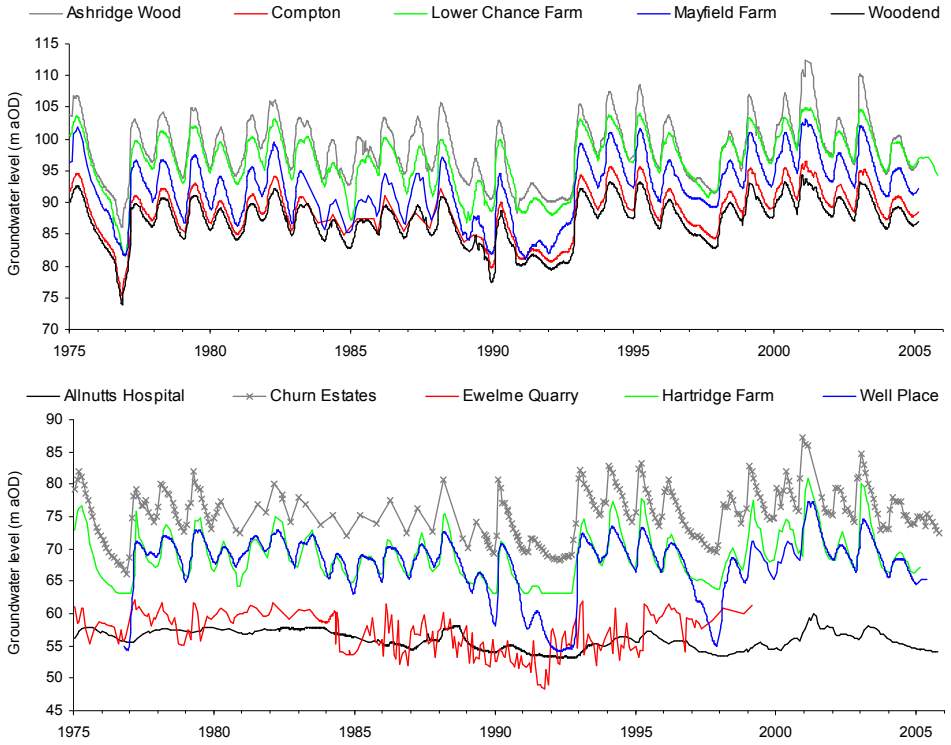
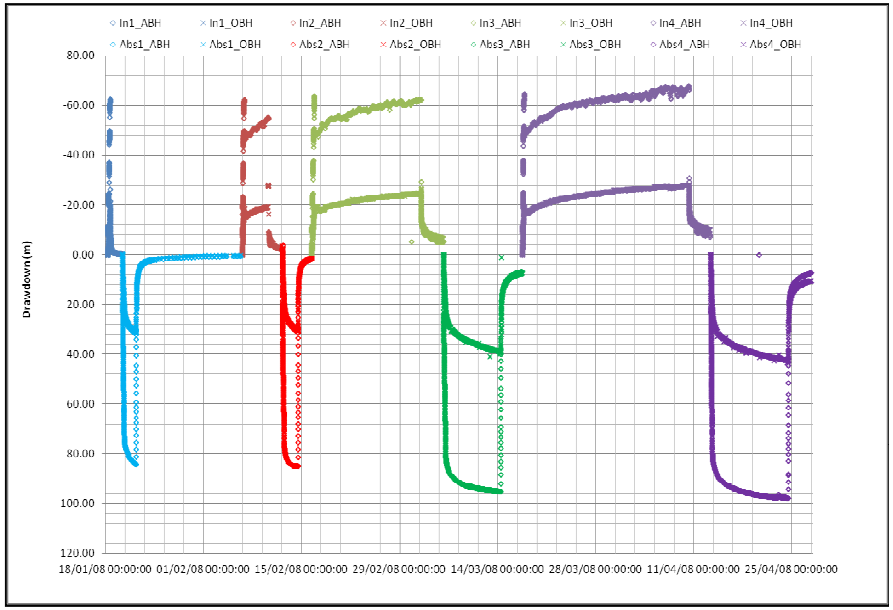
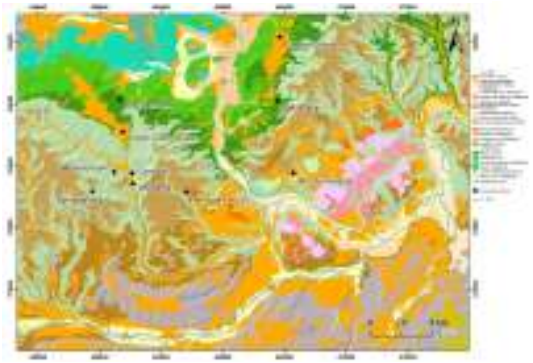
Temporal scales







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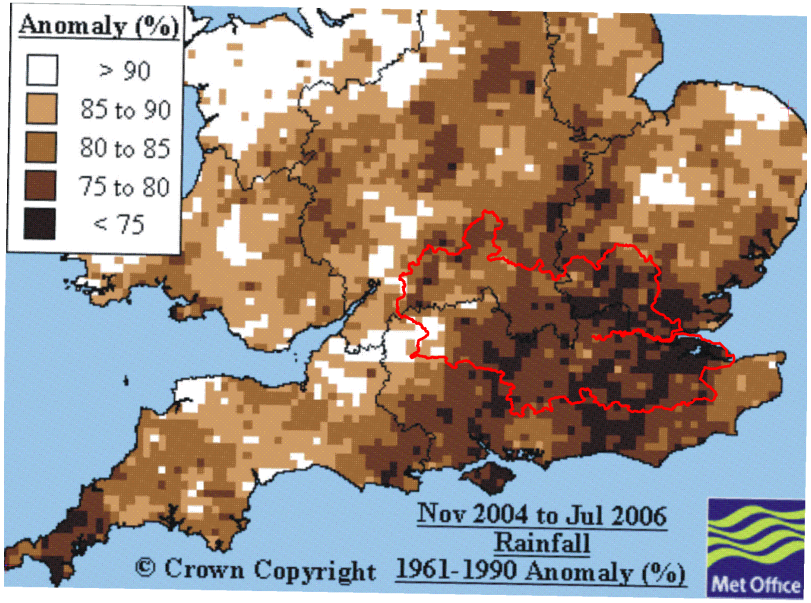
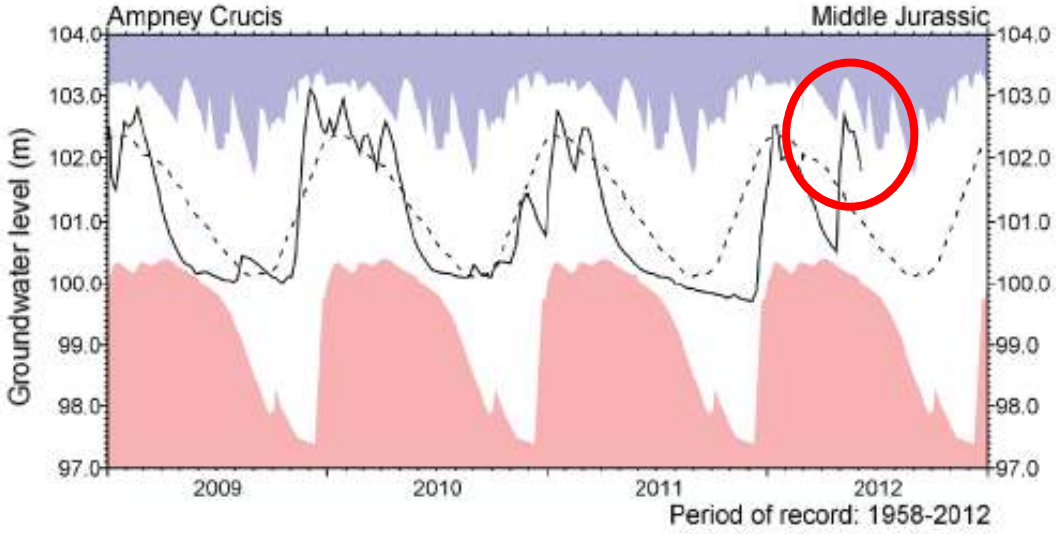
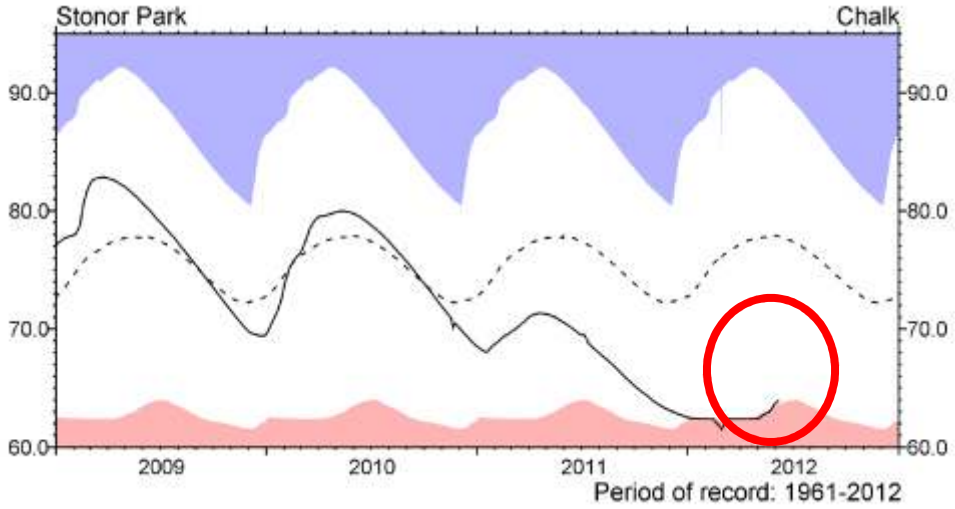
Droughts – spatial and temporal







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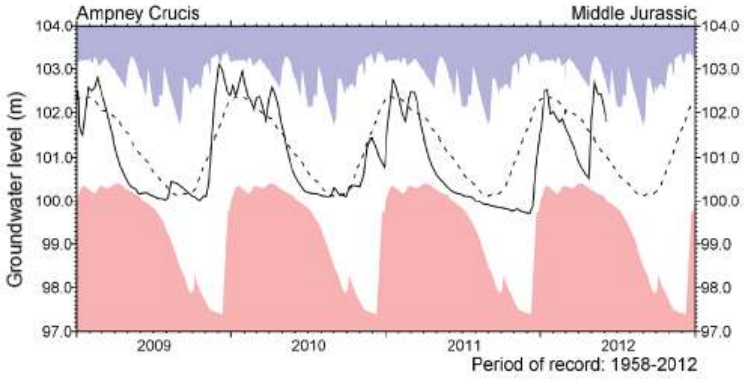
Response times

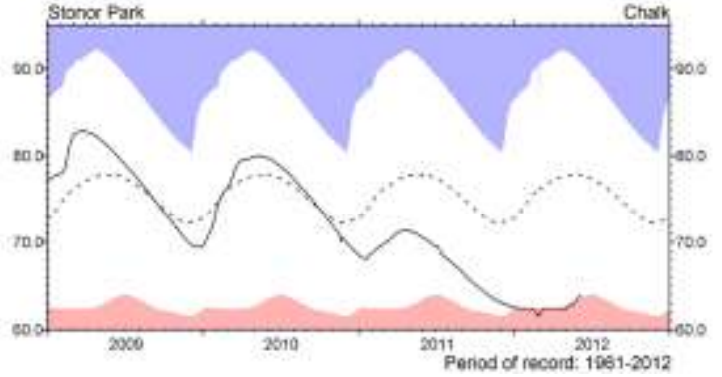
Limestones

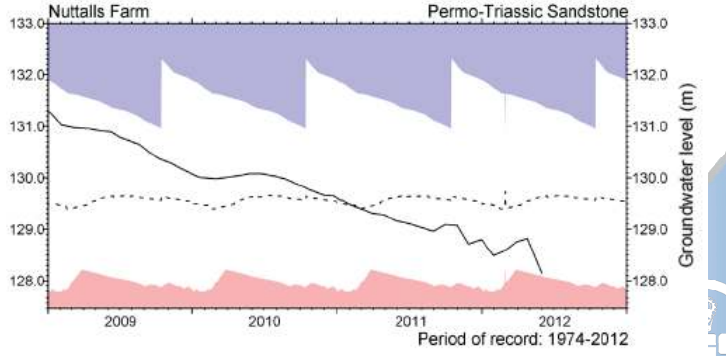
Chalk

Sandstone

Decreasing speed of response







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Order

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What next?

- Improved conceptualisations where it matters, i.e. around Blue Pool
- Improved understanding of catchment scale changes due to extremes, i.e. impact of droughts on Cotswolds
- Water balances at a catchment scale and the importance of understanding smaller scale processes, i.e. recharge in the Eden
- Representation of boreholes within regional models: ZOOMing grids and embedded models

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