British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Hydrological extremes CWC project – Project Board Meeting @ Imperial College

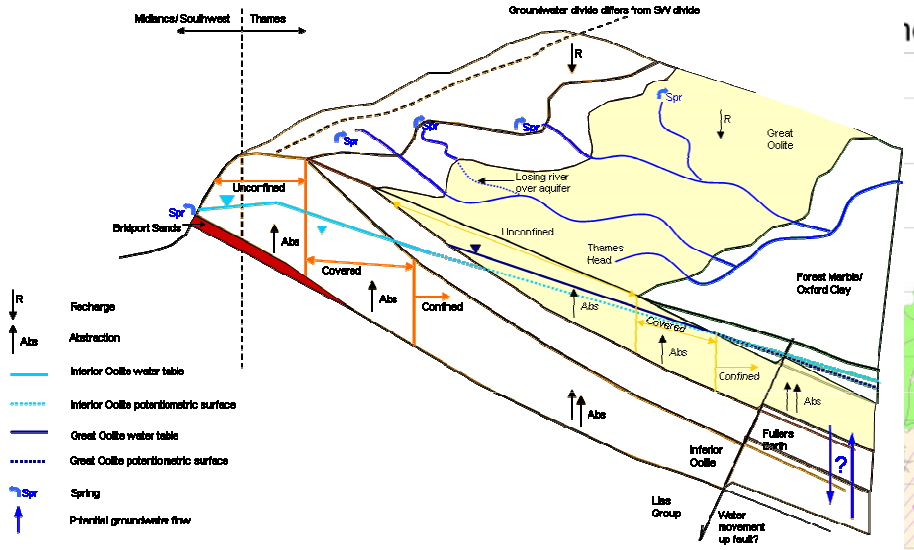
14th February 2011

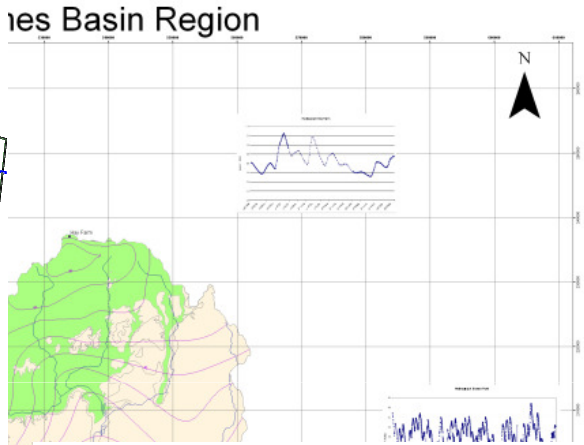
BGS's input

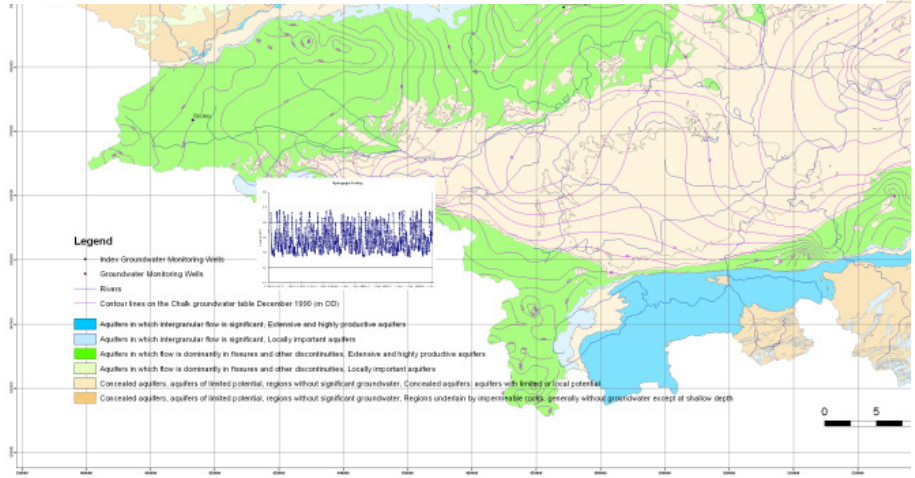
Feedbacks and extremes – groundwater perspective

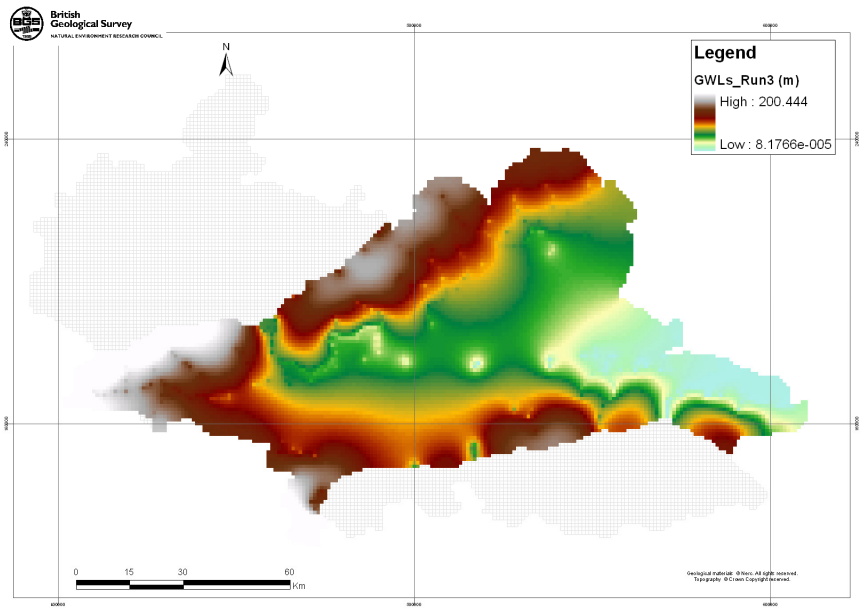
- Feedbacks:
  - Climate change – Rainfall, temperature, windspeed, etc.
  - Land-use: human and natural response to CC
  - Recharge and abstraction – both modified
- Extremes:
  - Droughts and floods
  - Impacts on abstraction (DO)

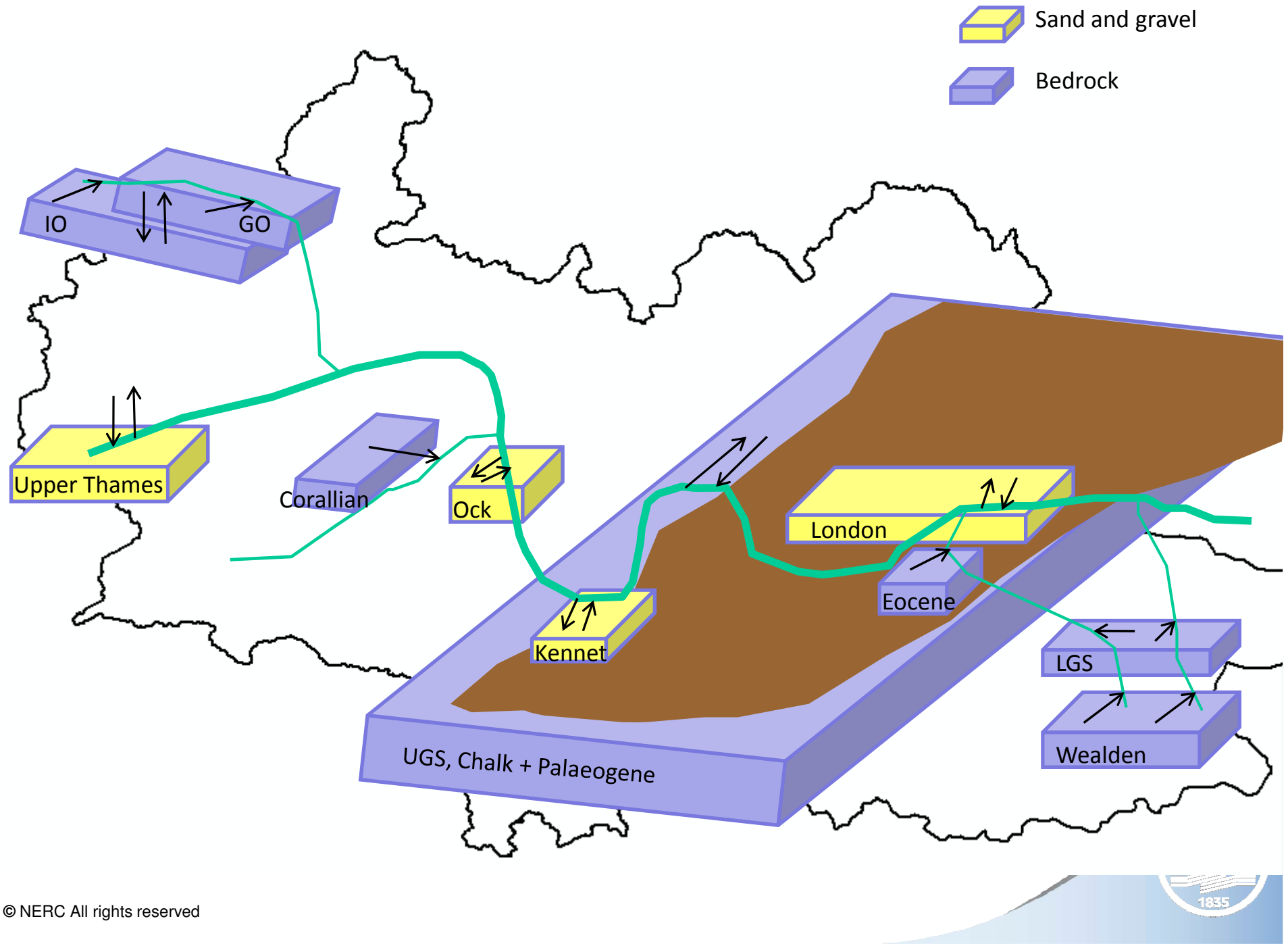
Scale and complexity - Thames Basin









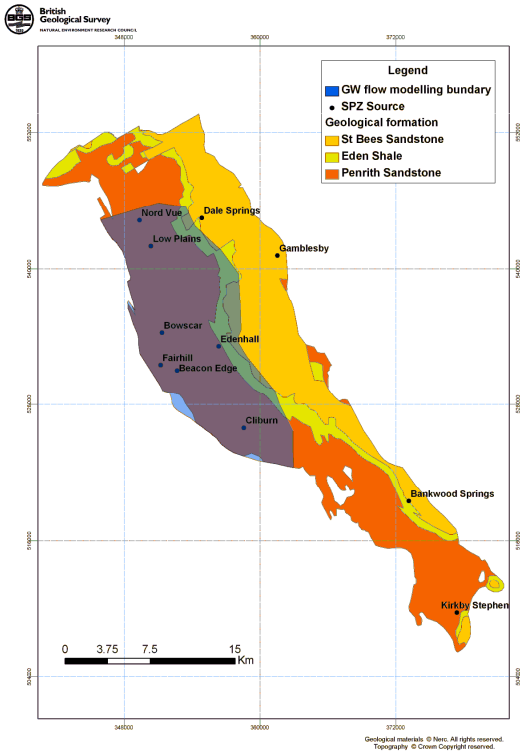


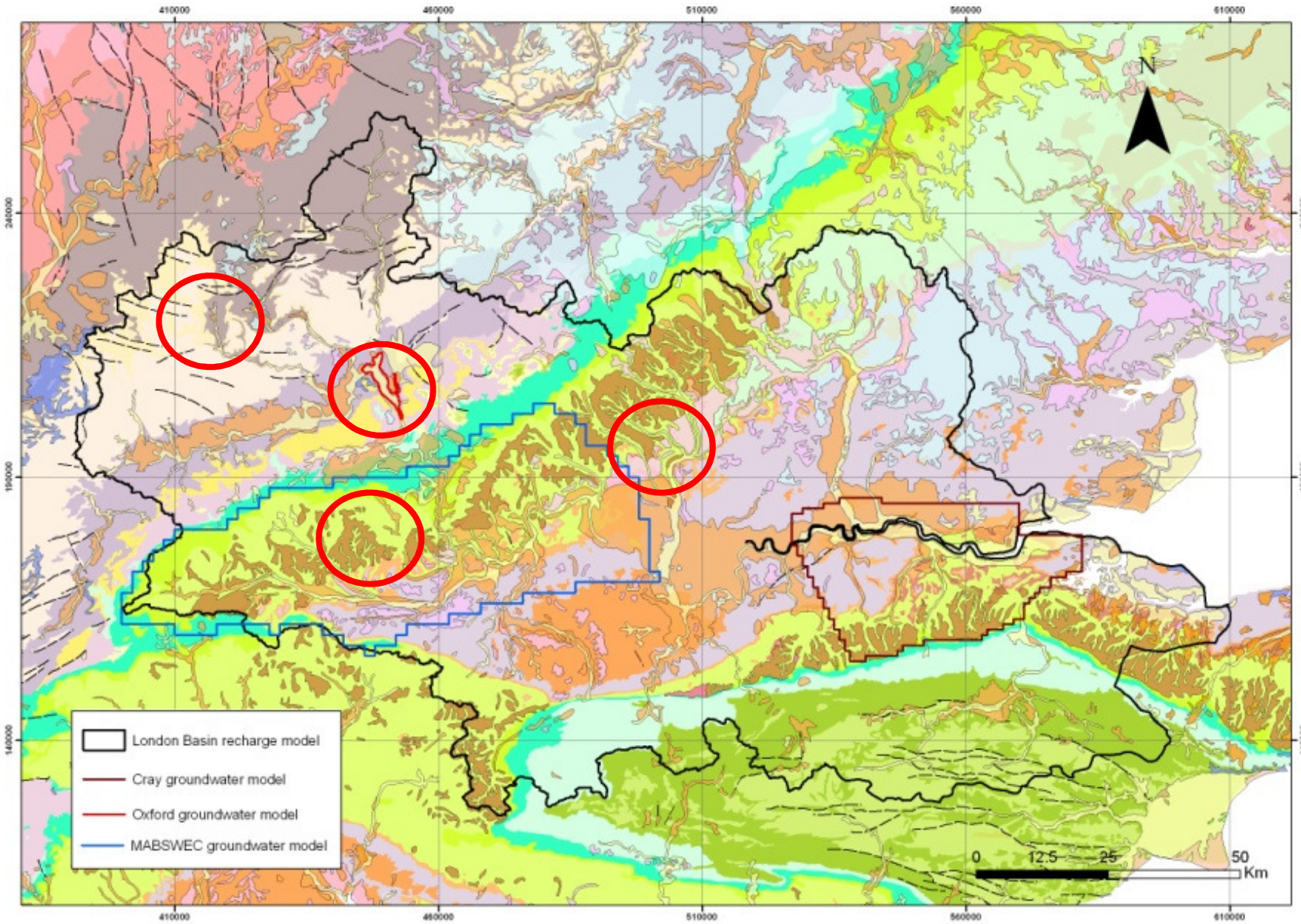
Potential study areas

- Thames basin
  - Oxford – GW enhanced flooding
  - Colne valley – adited sources
  - Pang/Lambourn – GW flooding and drought
  - Jurassic Lst – Baseflow under drought conditions

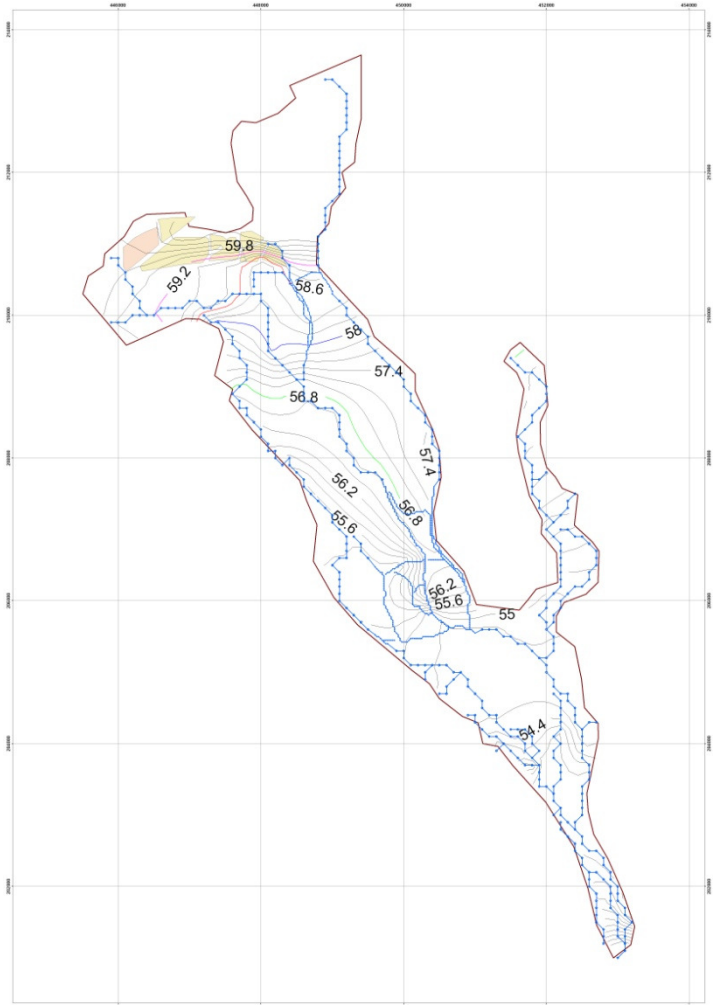
Not forgetting: Isle of Wight

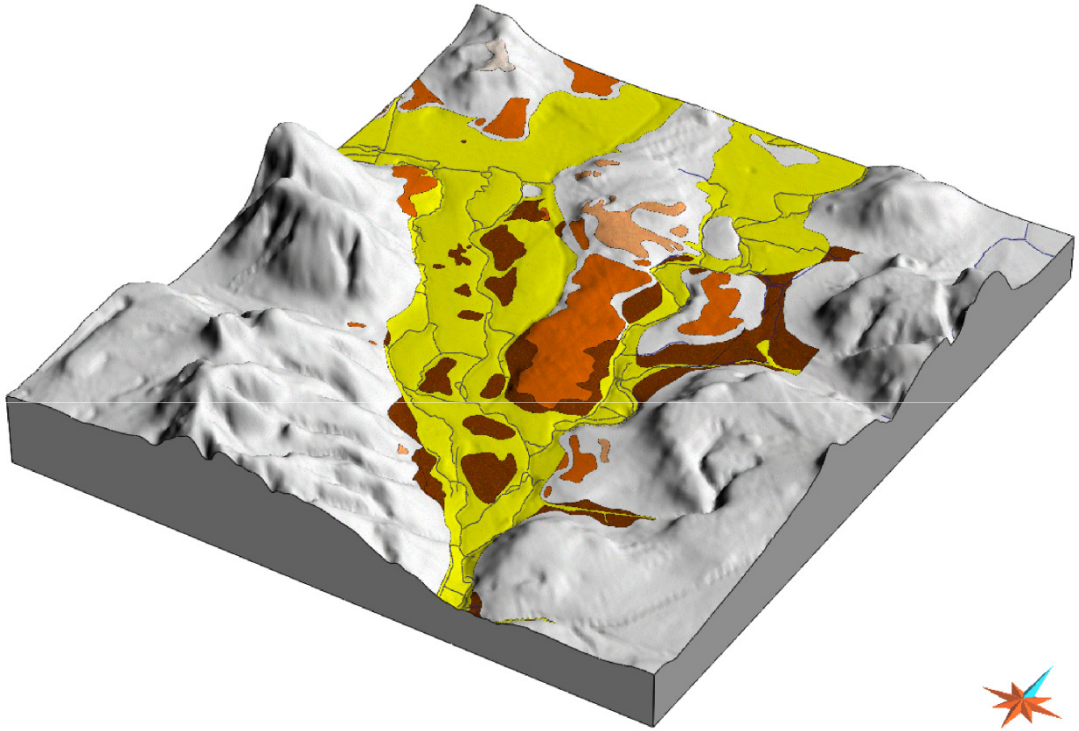
- Eden Valley
  - Role of GW in flooding??
  - Security of GW abstraction



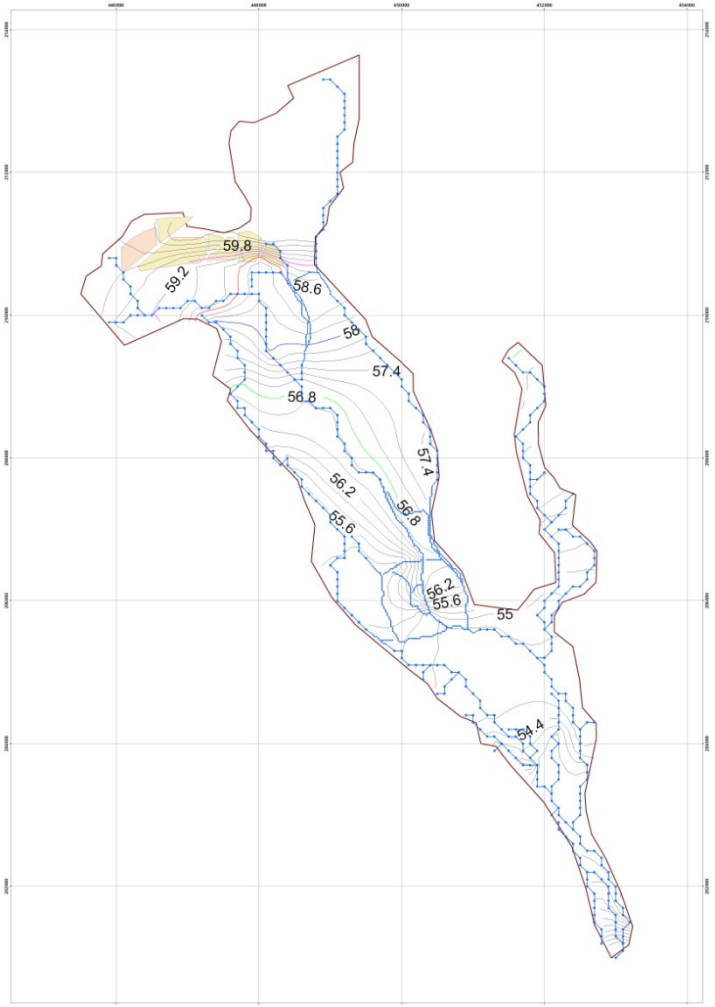


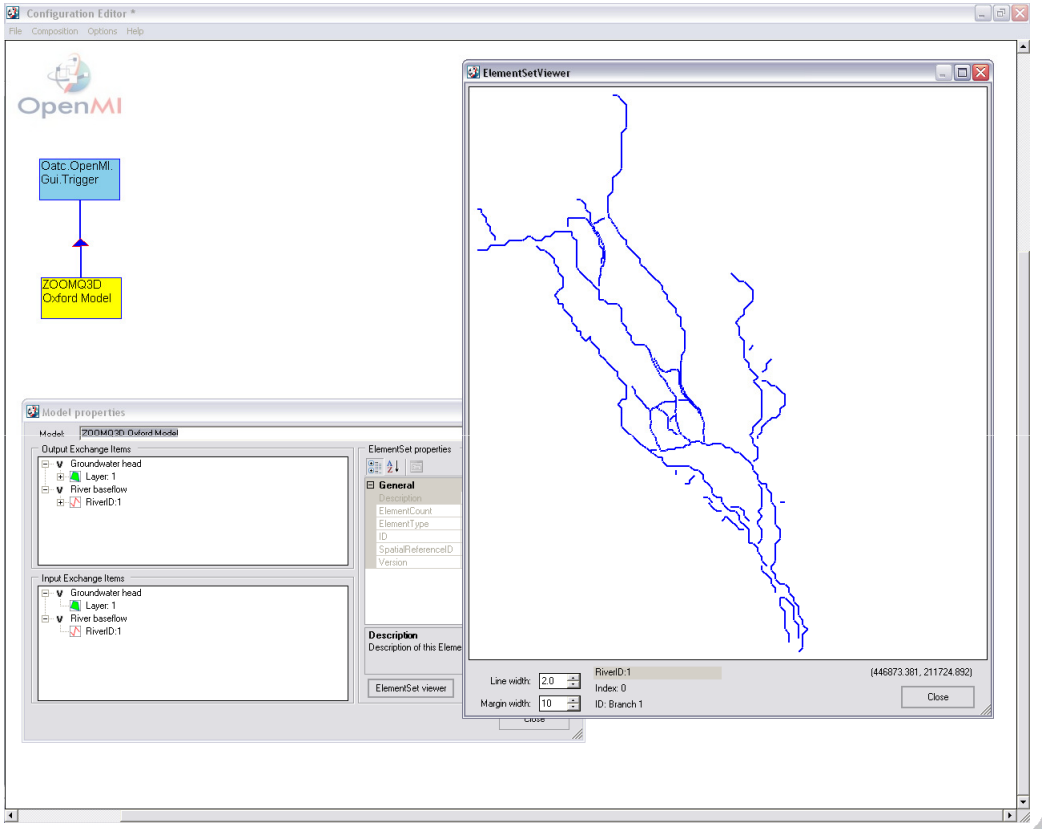
Oxford



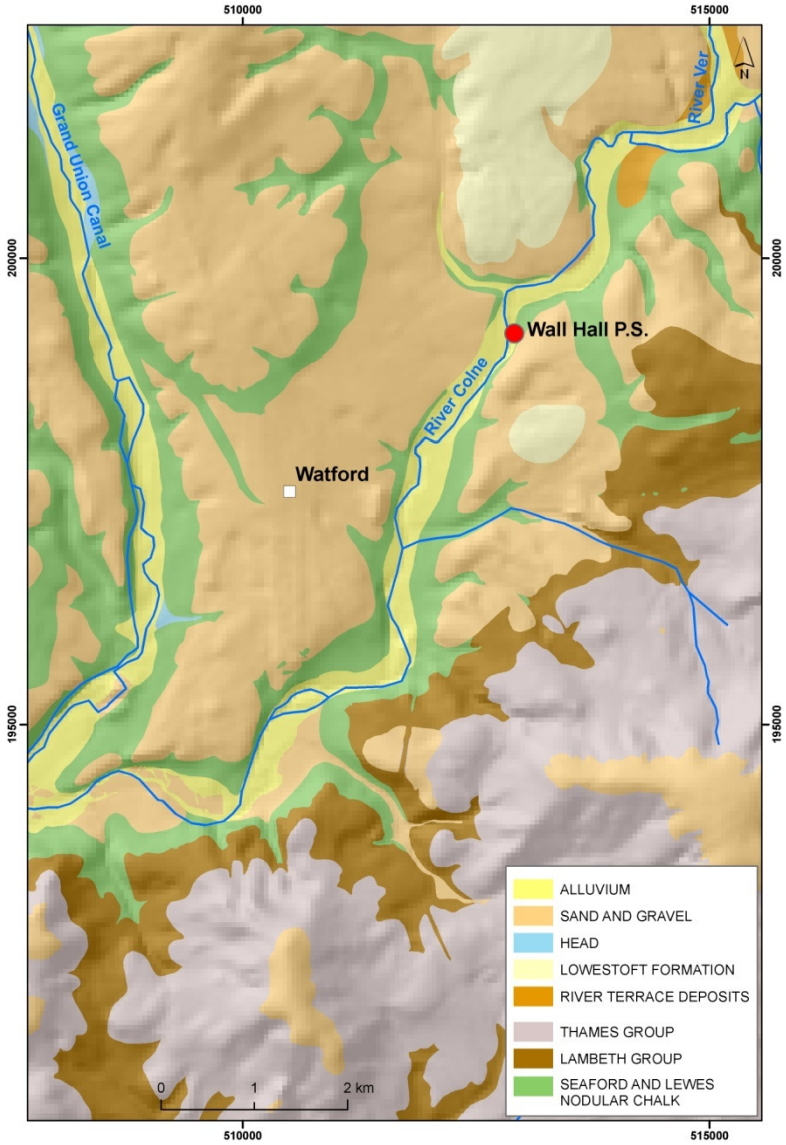


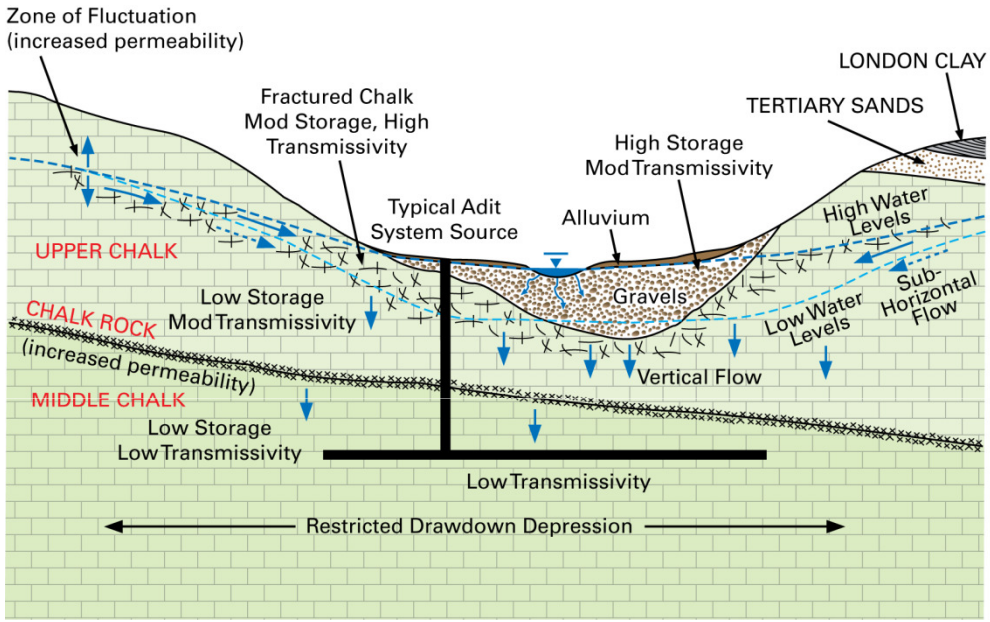
Oxford





Colne Valley

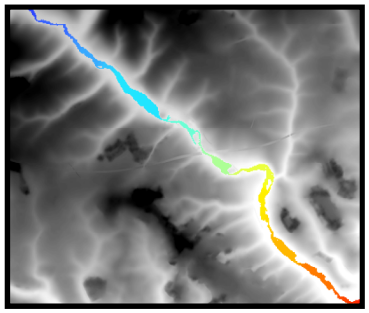


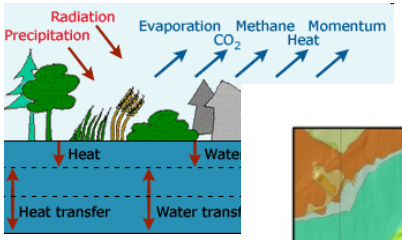


Note alluvium, sands and gravel, and river terrace deposits

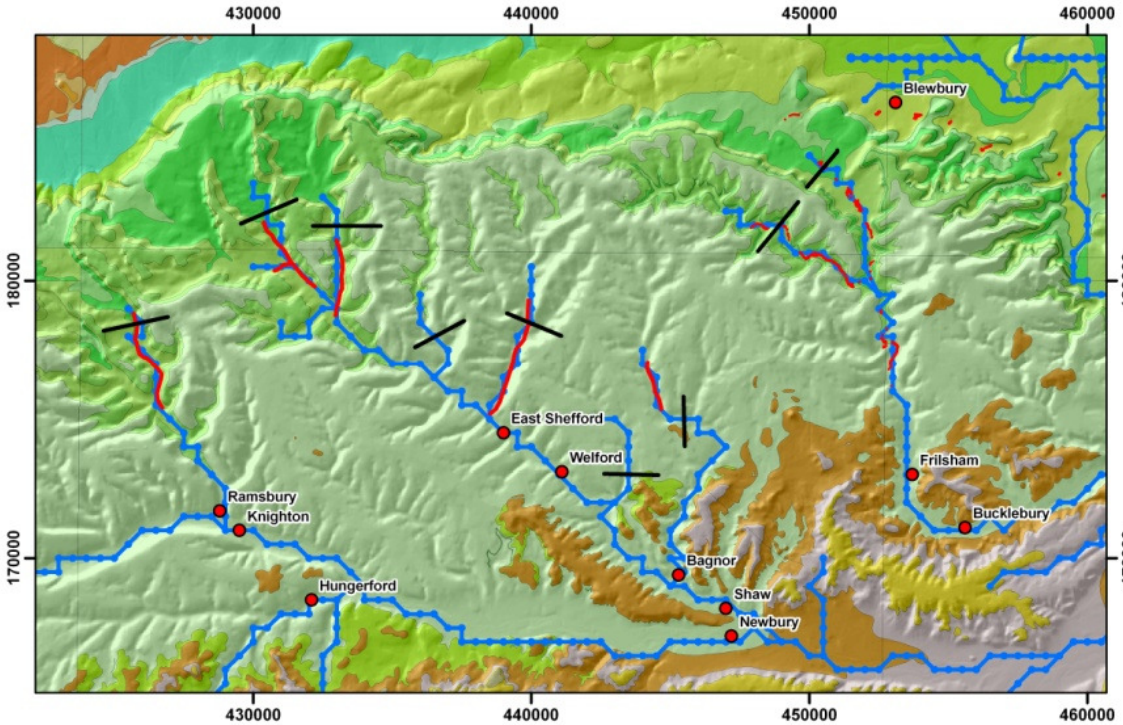
Pang/Lambourn

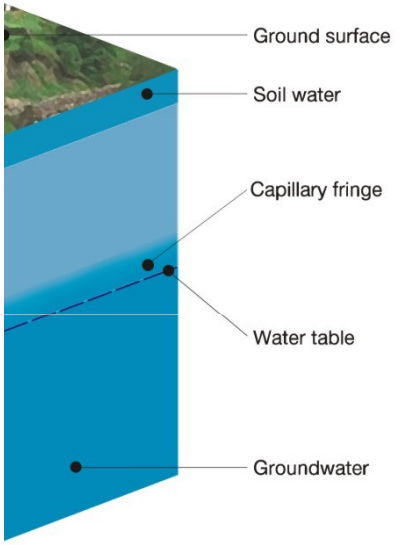
Overland Flow

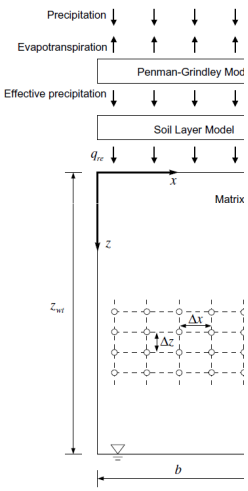


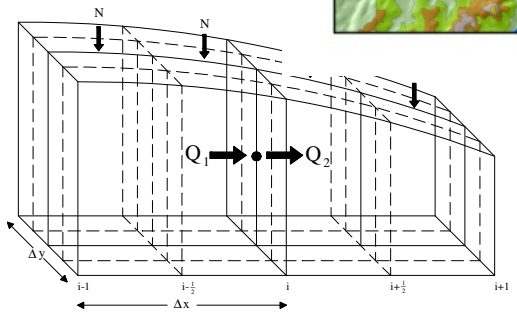


JULES: Soil Moisture



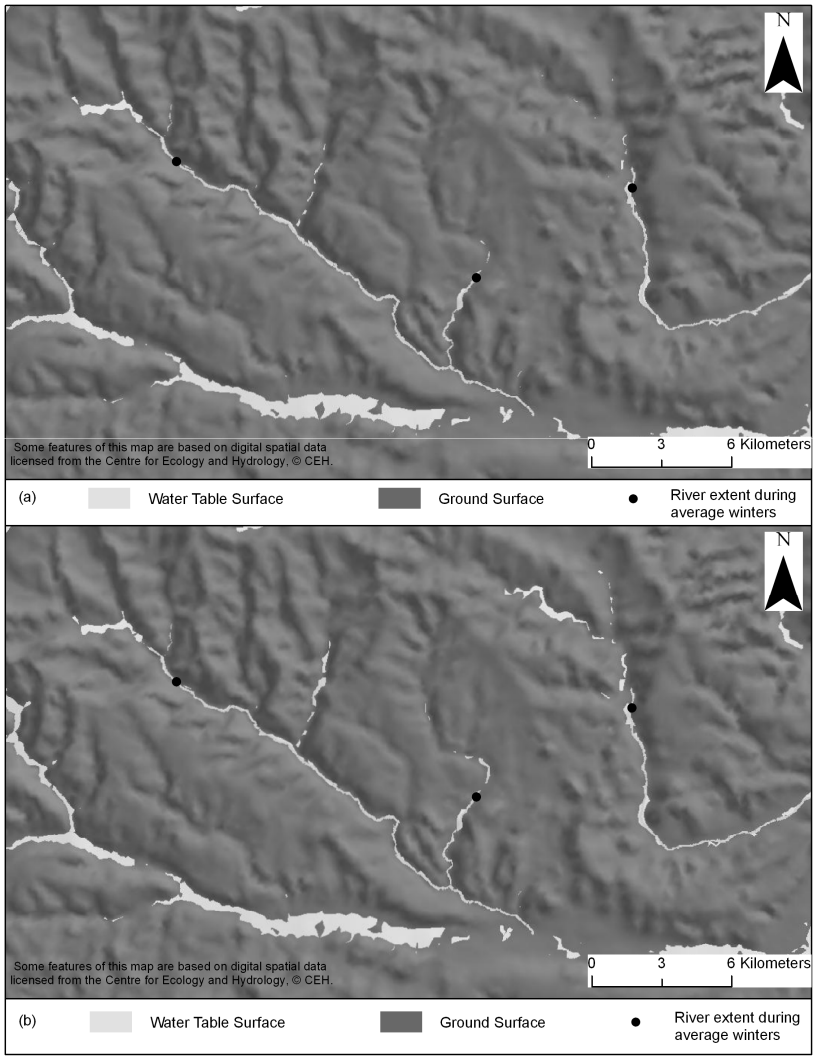




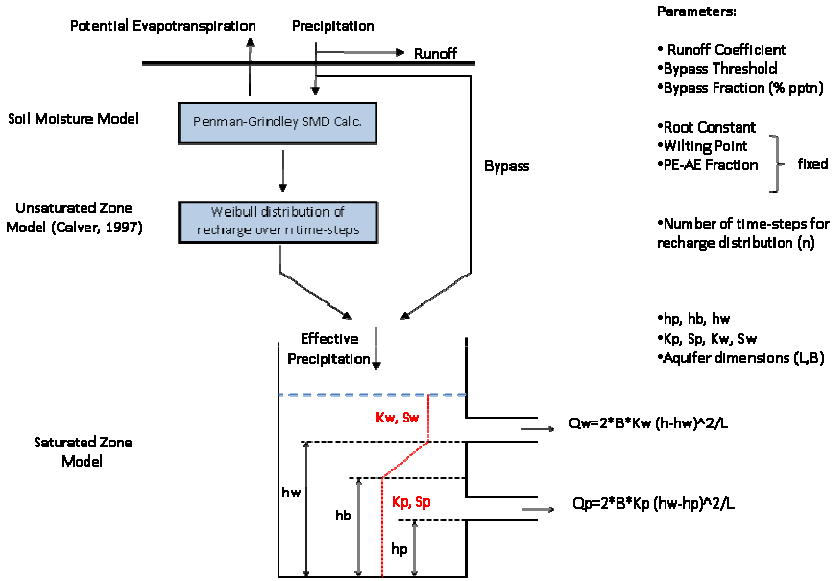


ZOOMQ3D:
Groundwater Flow

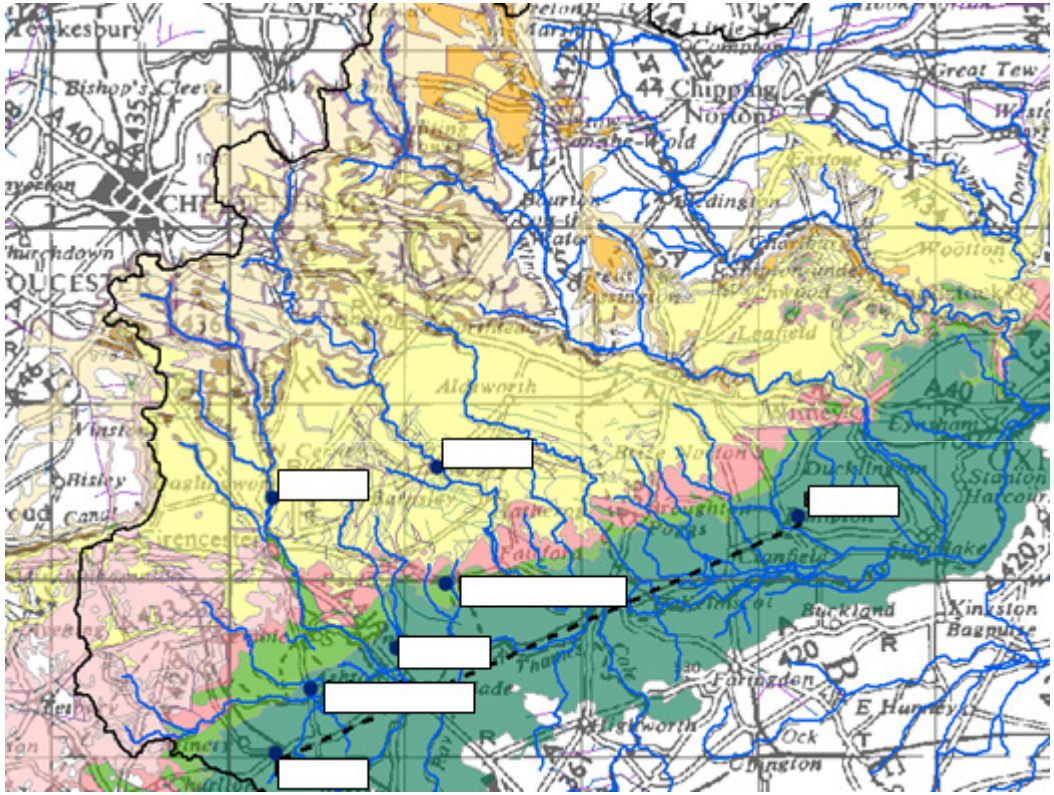
Pang/Lambourn



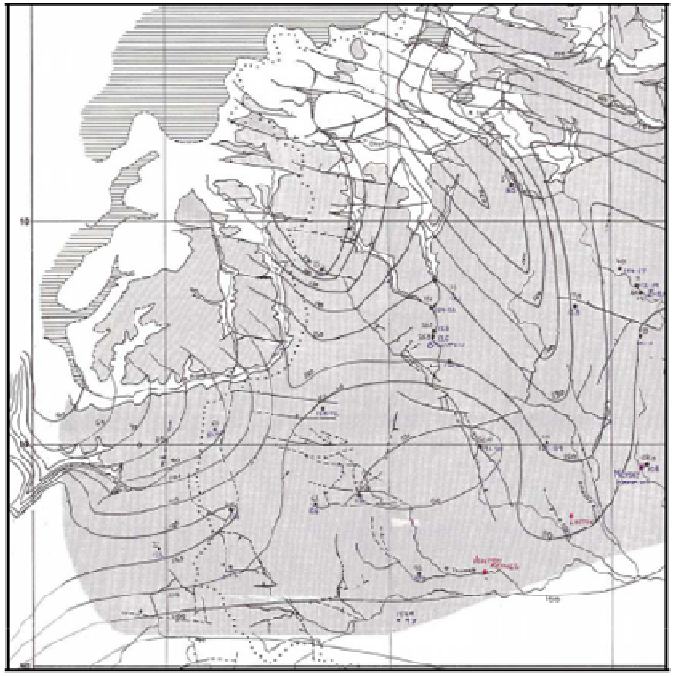
Simplified Modelling



Jurassic Lst



BRIDPORT SAND FORMATION
CHIPPING NORTON LIMESTONE FORMATI
CORNBRASH FORMATION
FOREST MARBLE FORMATION
FULLER'S EARTH FORMATION
GREAT OOLITE GROUP
INFERIOR OOLITE GROUP
KELLAWAYS FORMATION
OXFORD CLAY FORMATION
SHARP'S HILL FORMATION AND FULLERS



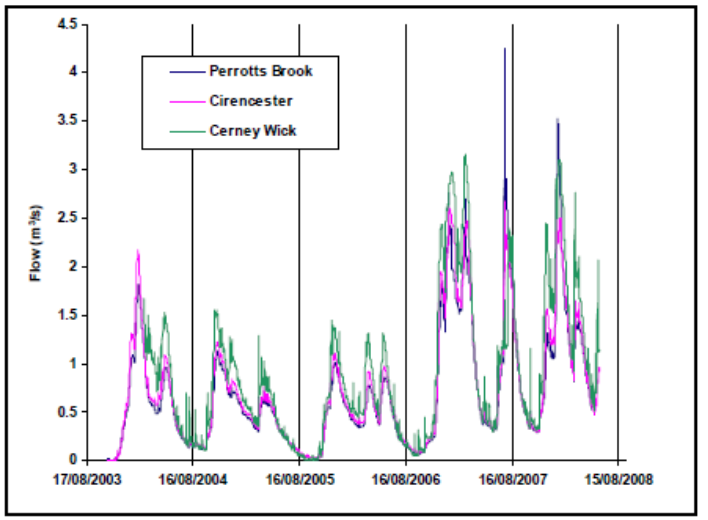
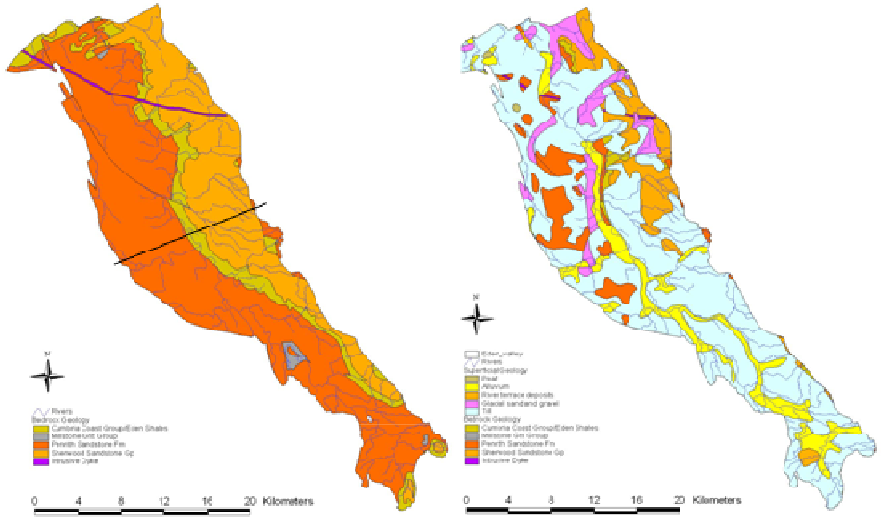
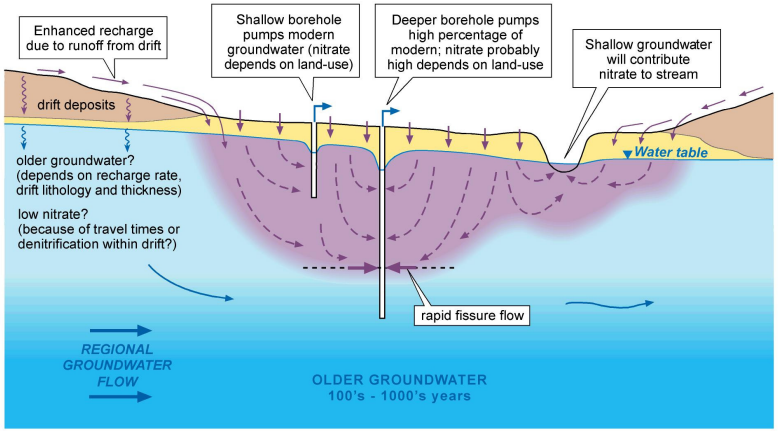


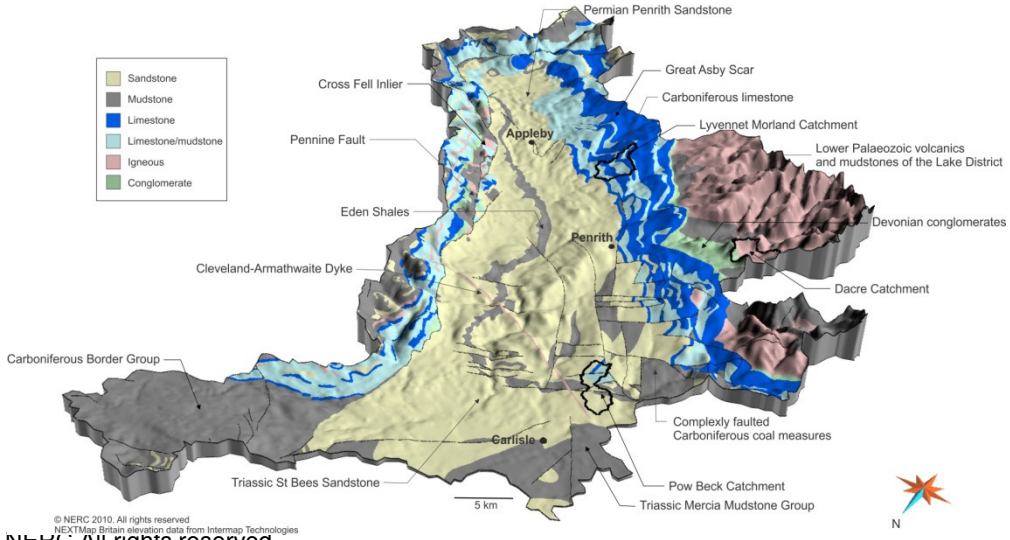
Figure 4.1 Flow between 2003 and 2008 at the long term gauging stations on the River Churn

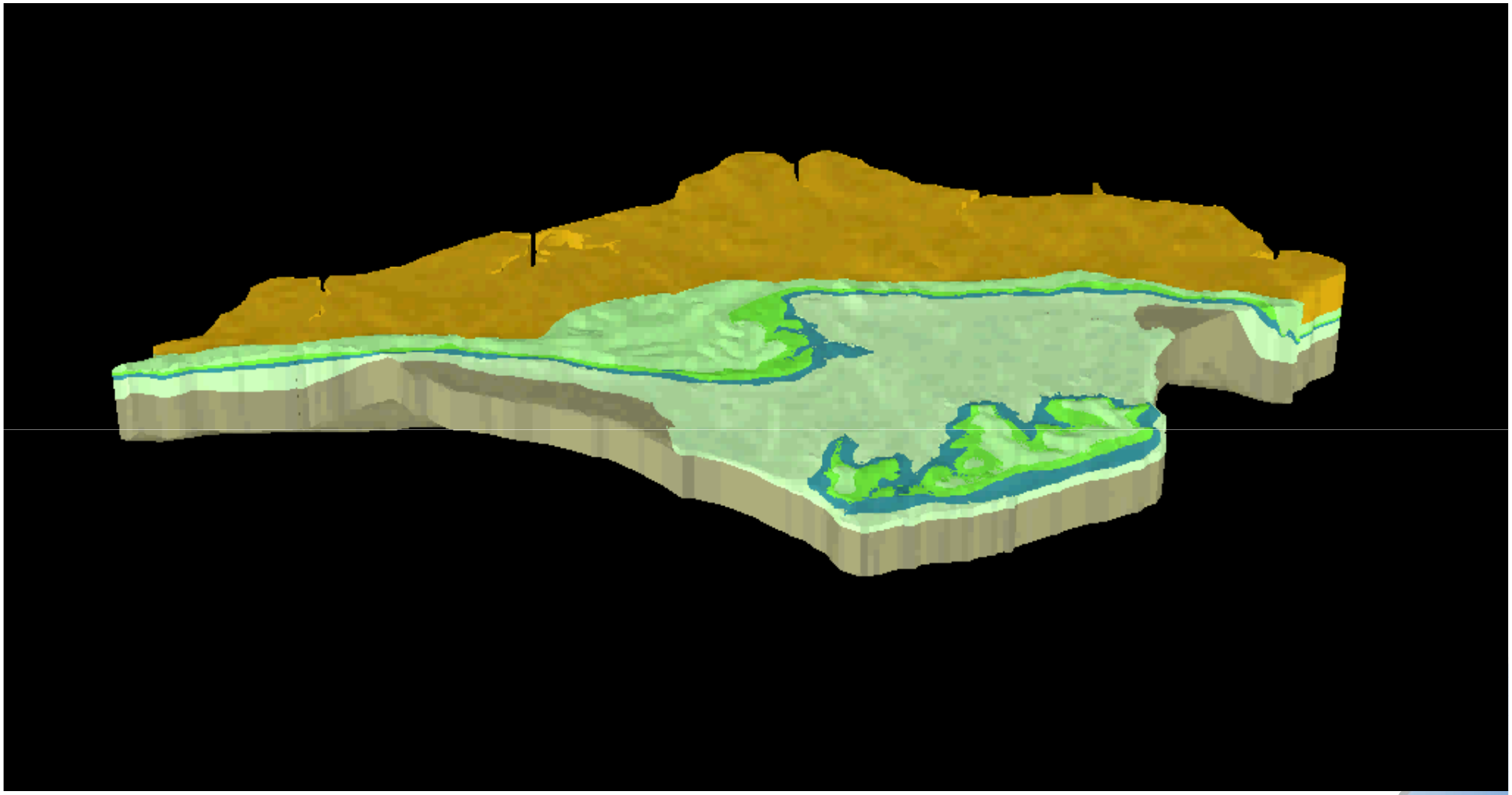
Eden Valley



CONCEPTUAL MODEL OF GROUNDWATER FLOW SYSTEM







Catchment	Area	Geology	Issue	Current understanding	Approach
Eden	DTC test catchments	Permo-Triassic Sandstone overlain by superficials	Groundwater availability during drought	Good - background u/s Limited – DTC catchments	Develop CM and GW model – recharge through superficials likely to be higher important
Thames	Oxford	Oxford Clay overlain by superficials	Groundwater flooding	Very good	Build on existing understanding/model
	Pang and Lambourn	Chalk overlain by superficials	Groundwater flooding and drought	Very good	Build on existing understanding/model
	Cotswolds Jurassics	Sub-karstic limestone and complex structure	Baseflow to River Thames during droughts	Limited	Develop understanding of whole area then apply simplified approach.
	Colne Valley	Chalk overlain by superficials	Behaviour of adited sources during droughts	Good in valleys, poor elsewhere	Extend MaBSWeC to east by one catchment and then develop understanding/simulation of adited sources in the Colne Valley.
Isle of Wight	Chalk	Cretaceous overlain by superficials	Groundwater availability during drought	Good - background u/s	Develop understanding of whole area then support PhD student.

What we think we're doing

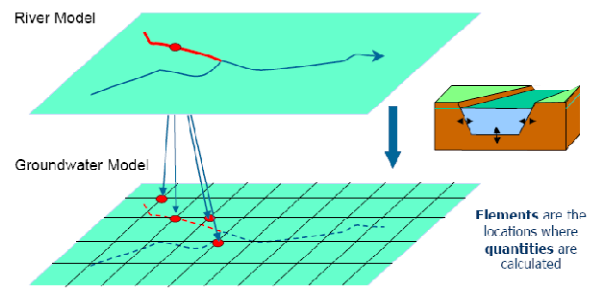
1. Choose study areas: likely to be Colne Valley, Thames Chalk, Jurassic Limestone and Oxford as well as Eden Valley. (WP2a)

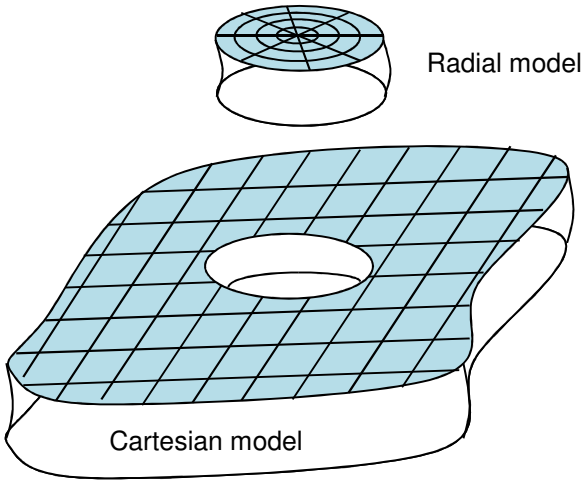
2. Develop geological and hydrogeological understanding. Characterisation of soil and, superficial and bedrock cover (thickness and hydraulic properties).(WP2a)

3. Decide on generic examples and create investigative models to understand particular issues.(WP2a/b)

4. Develop modelling system to tackle operational issues – linking regional scale model to borehole scale models.(WP2b)

5. Run scenarios: Flooding and droughts.(WP2c)





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