20th Century Problems, 21st Century Solutions: Groundwater in the north-west of England

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United Utilities

Presentation Objectives

- UU supply system
- Groundwater issues in the NW – 20th Century problems
- dWRMP - Supply/demand; an uncertain future?
- Back to the future... – 21st Century solutions

UU supply system

- 7 million people, 2.9 million households, 0.2 million businesses
- 1900 ML/d (average) into supply, 4 resource zones

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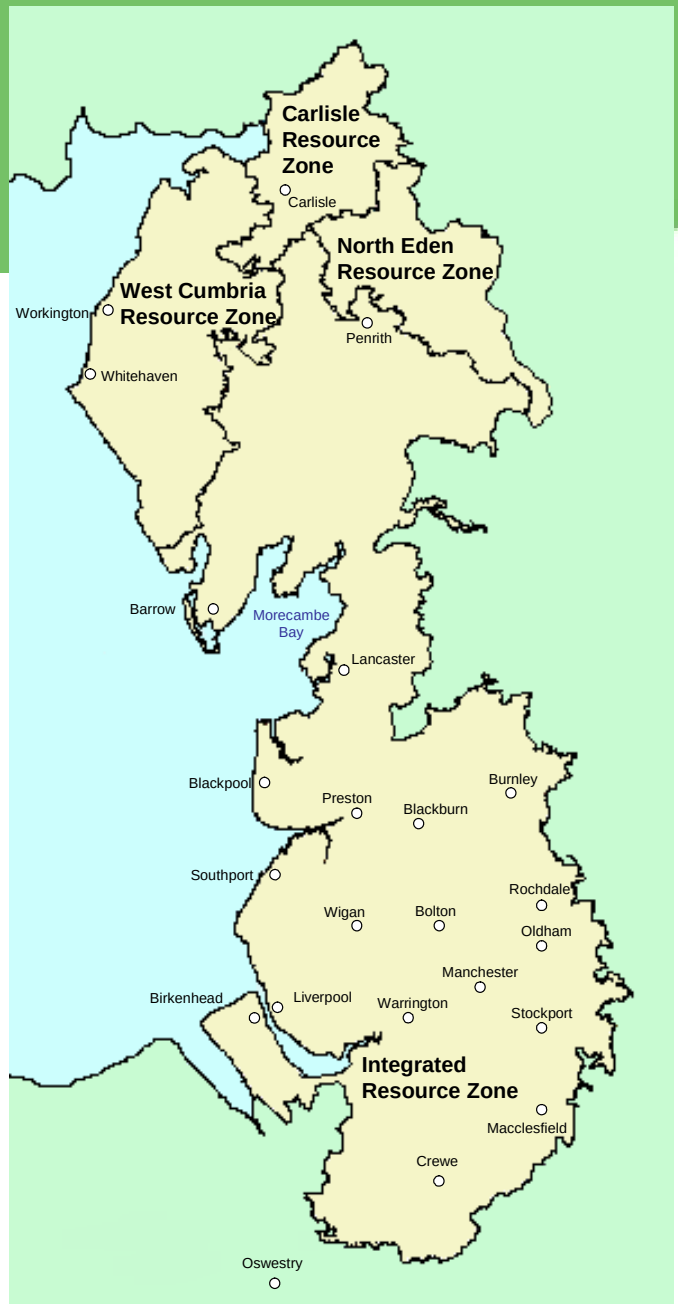
- 2000 km of aqueducts/large diameter trunk mains
- £4.5 billion on drinking water improvements since privatisation

Regional Resources



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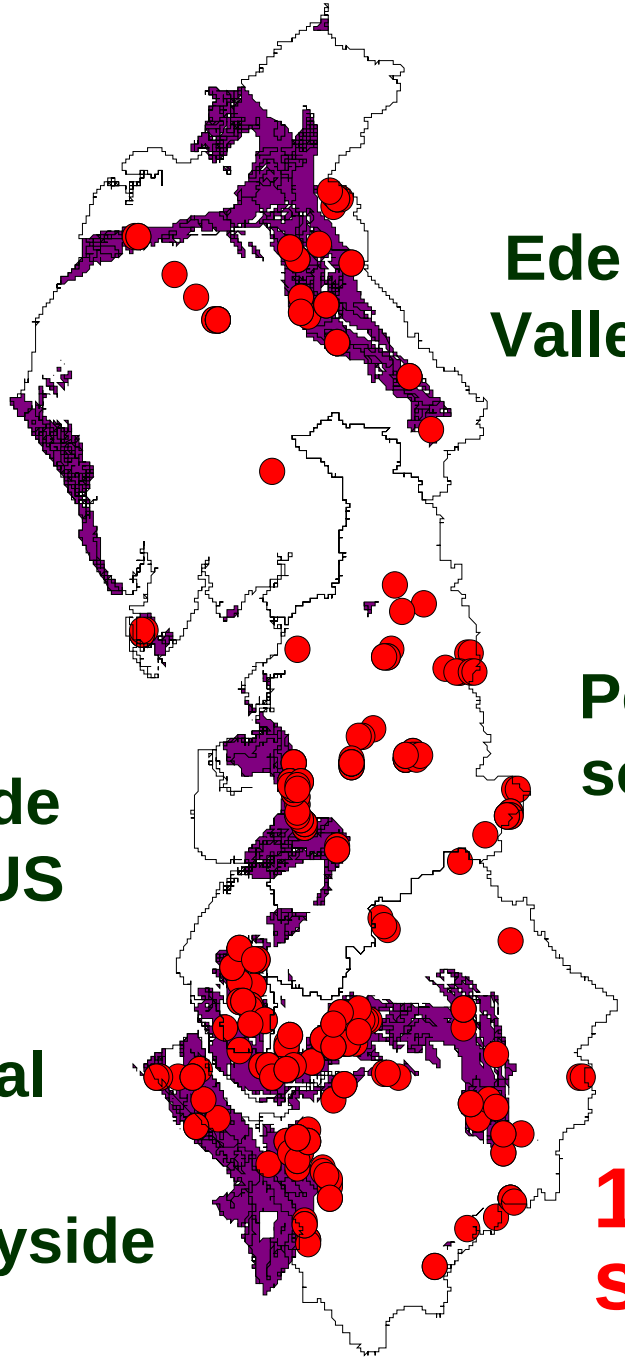
Groundwater Resources



West Cumbria

Eden Valley

Pennine sources

Fylde LCUS

Wirral

Cheshire, Merseyside

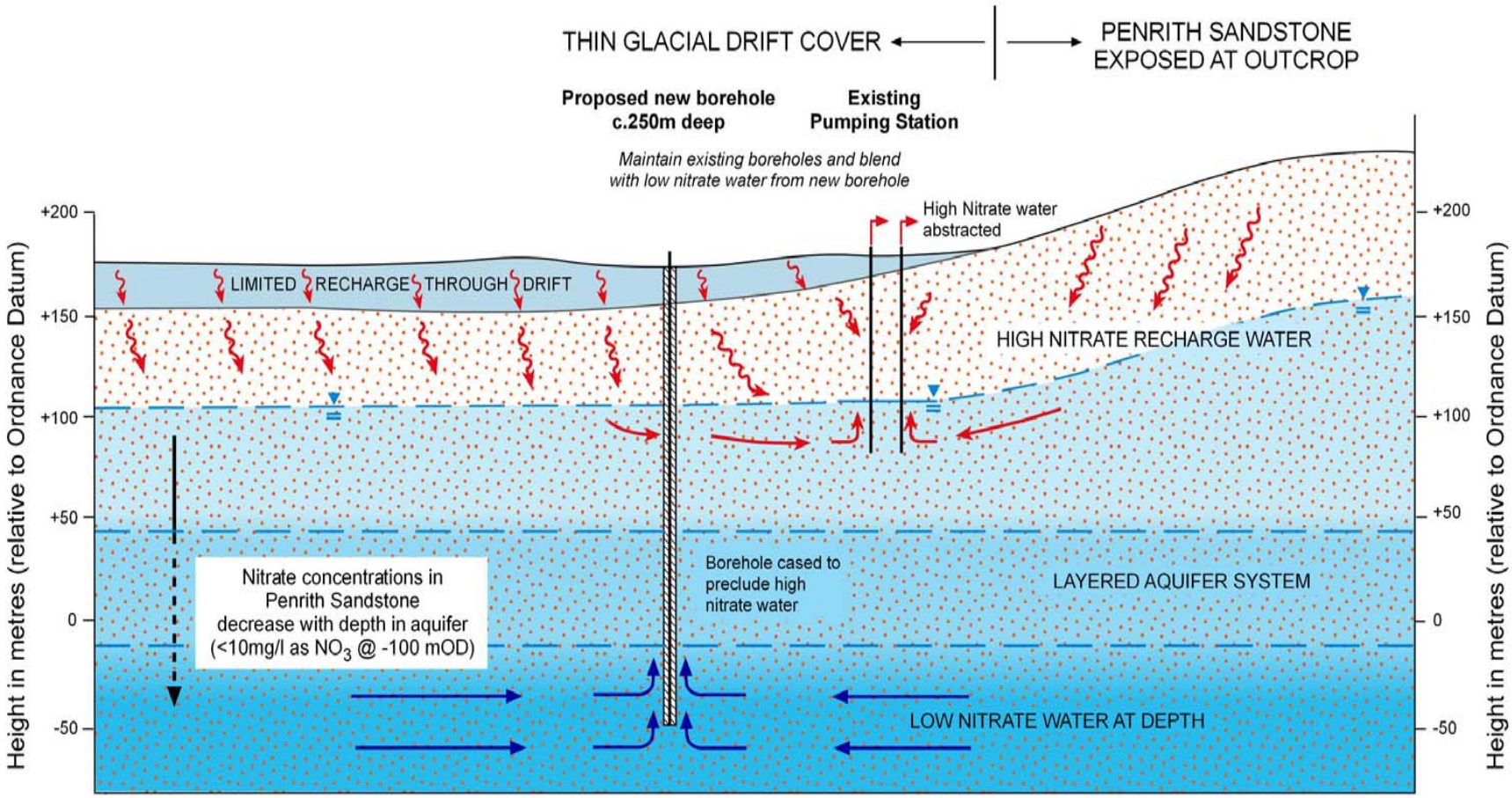
15% of total supply

What does groundwater abstraction look like?

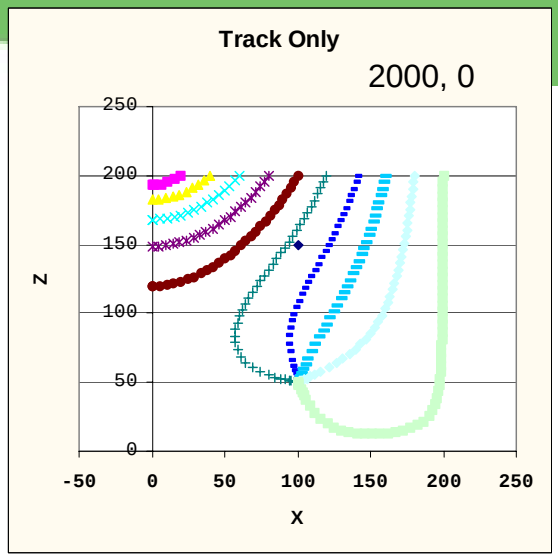
- Over 150 licensed sources
- Important input to UU's supply especially in IRZ
- Peak Demands
- Low risk – geology, high S, high T
- Apart from….
- Water quality
- AMP3 – process solutions – "*lets treat it*" – financial issues
- AMP4 – do we have to treat?

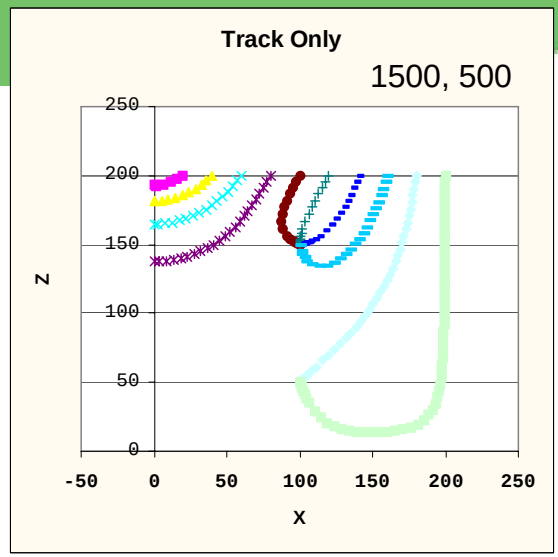

More NO_3
Eden Valley, Cumbria

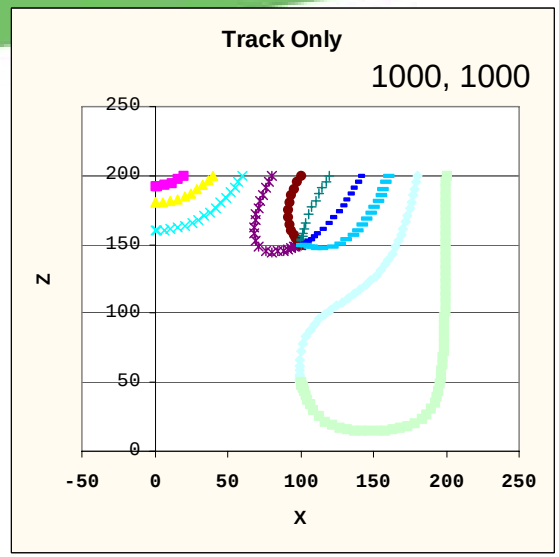
Eden Valley – conceptual model

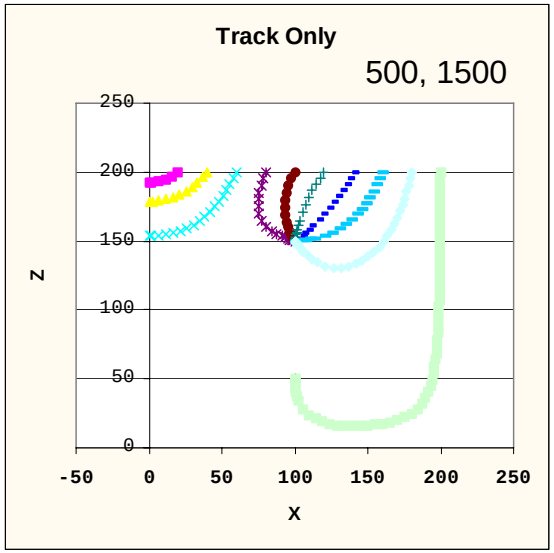


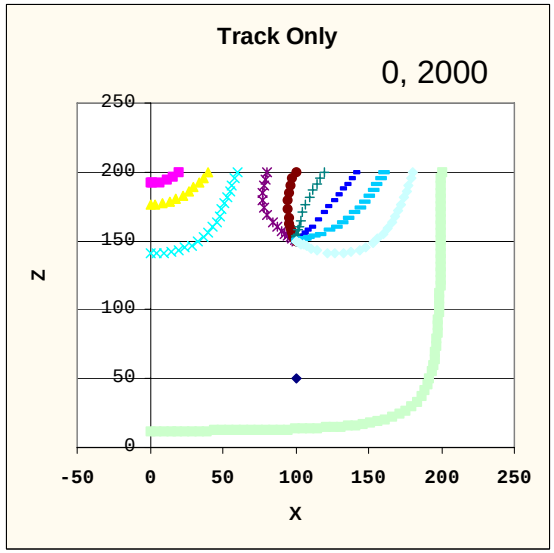
Eden Valley - Simplified radial flow model ‘scavenger’ type multiwell system











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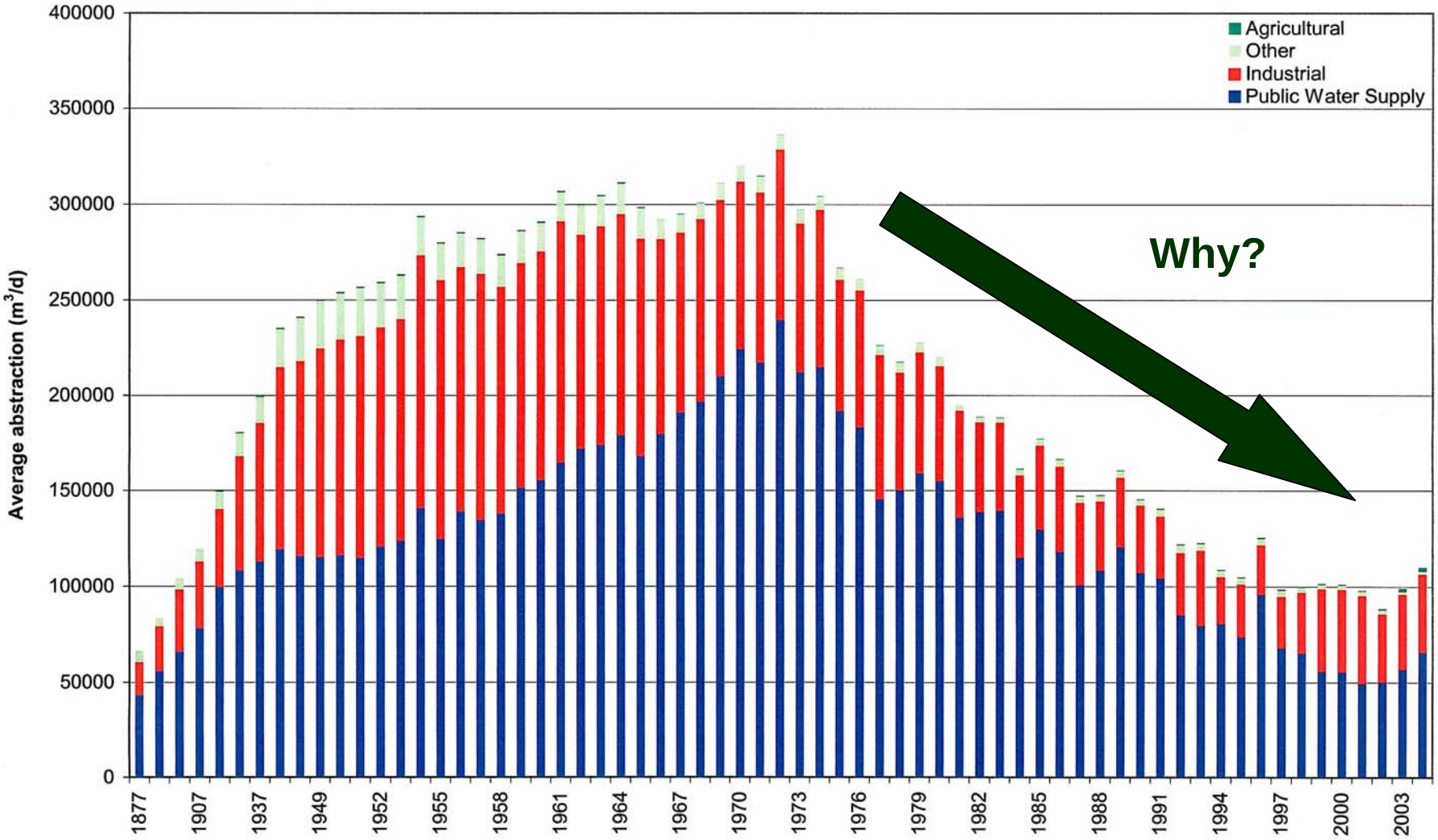
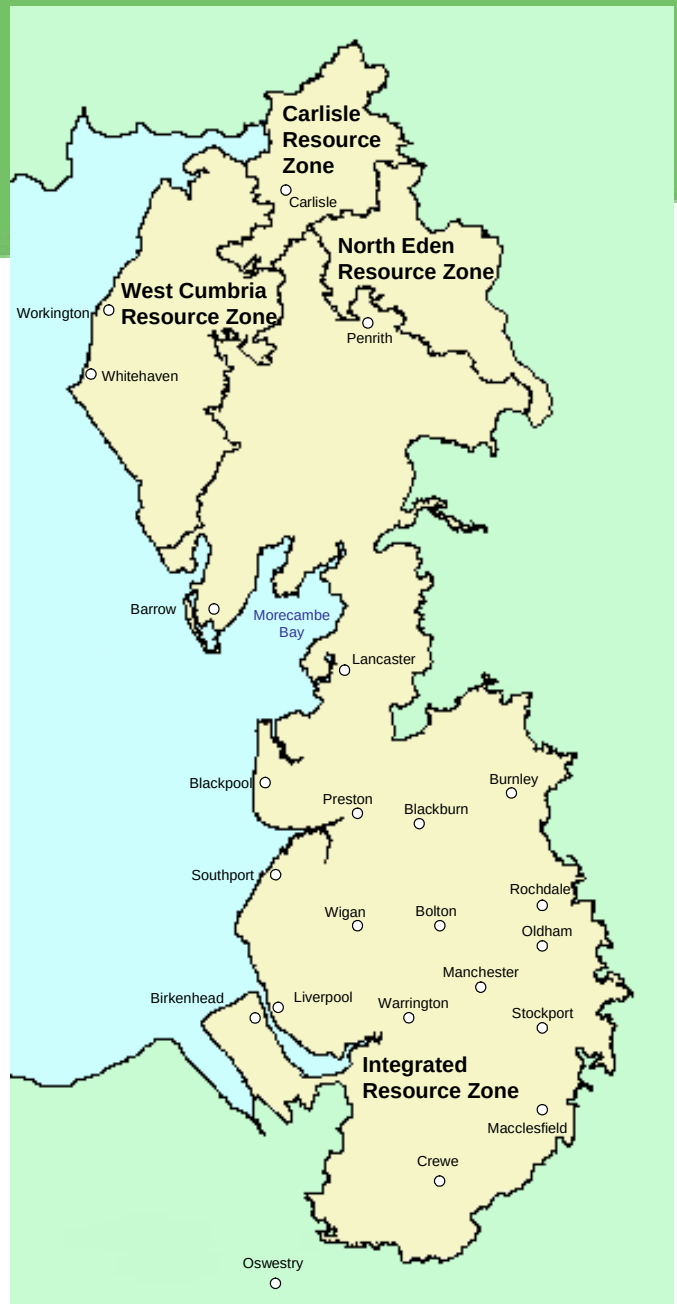
Long record of abstraction

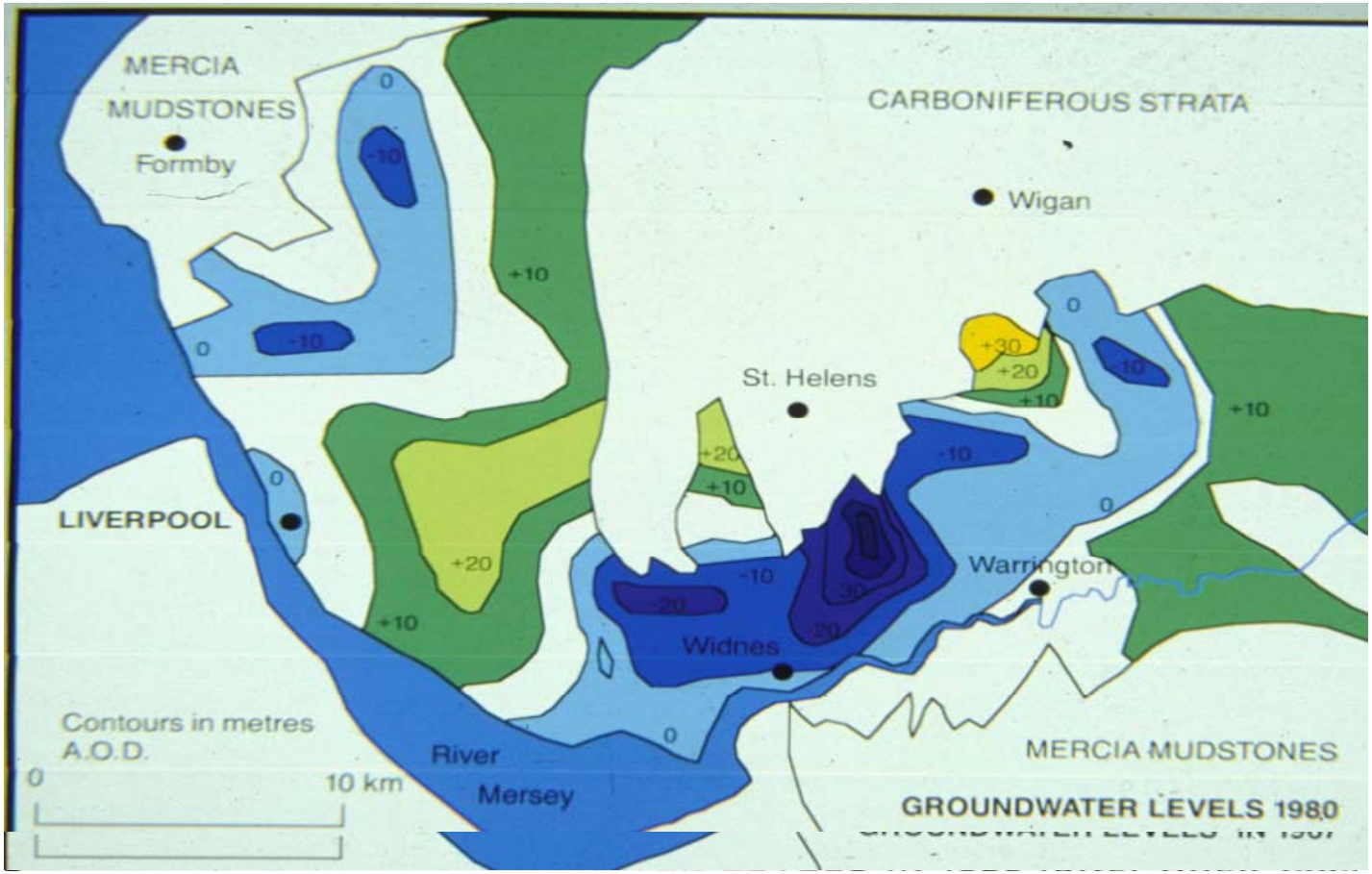


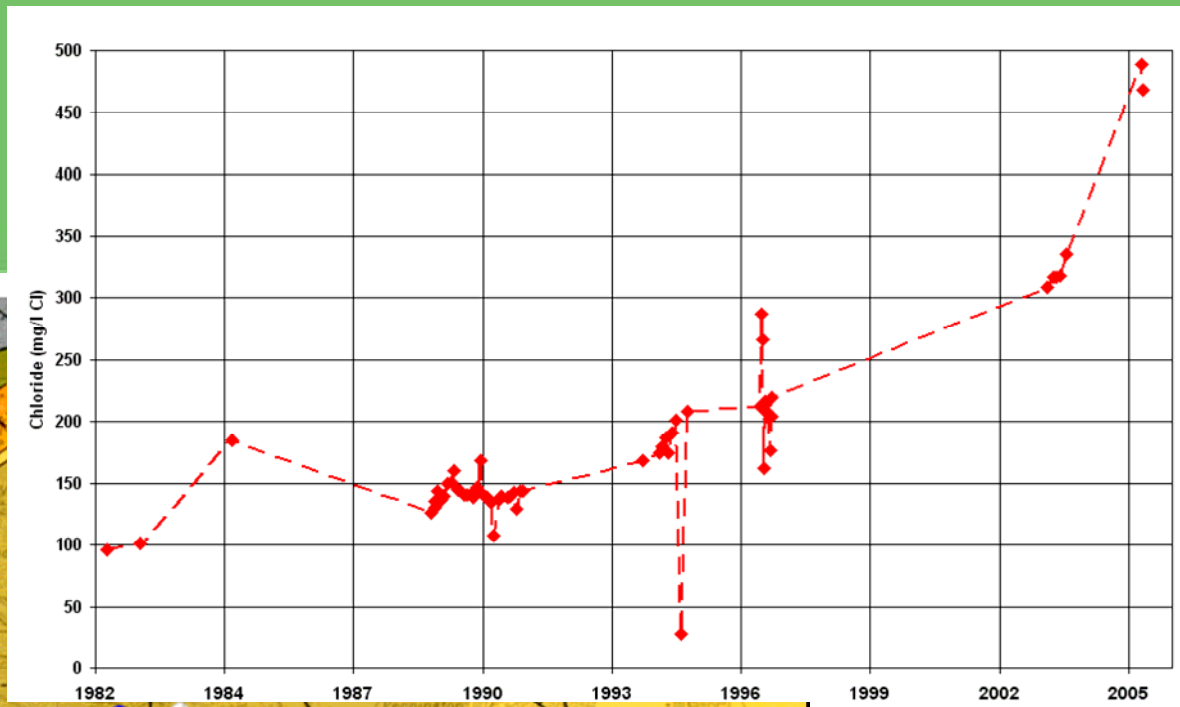
Integration…?

- Large transfer systems
- 70% of customers receive water via LDTM



A finite resource…?





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UU dWRMP aims

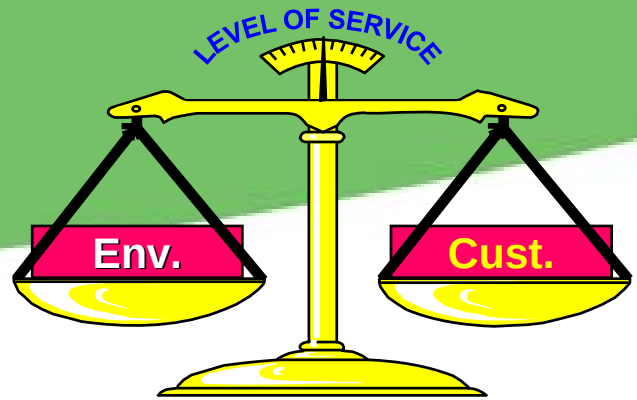
- Water supply/demand forecasts over the period to 2035

- To identify the best possible water resources and demand strategy
- To adapt to meet the challenge of climate change
- To ensure that abstraction from our water resources is sustainable
- To ensure our plans deliver the needs and priorities of our customers and other stakeholders

Key Challenges for dWRMP

- *Water Availability*
- Source Yield: 2024 ML/d (2007/08) to 1947 ML/d (2034/35)
- Sustainability reductions (HD, RSA): –46 ML/d at 2014/15
-  Huge range in predictions (+130 to -516 ML/d)
- Central estimate predicts -31ML/d by 2034/35
- Total: 77 ML/d

Key Challenges for dWRMP



- *Supply/demand balance*
- Demand ↓ Metering, water efficiency, non-household
- Leakage ↓
- Water source yield > dry weather demand
- Why do anything?
- *Uncertainty* (*aka headroom*) - what we can't predict (national approach)
- ↑ >200 ML/d by 2034/35
- -41 ML/d (2014/15); -97 ML/d (2019/20) - IRZ
- -89 ML/d (2024/25); -52 ML/d (2034/35) - IRZ

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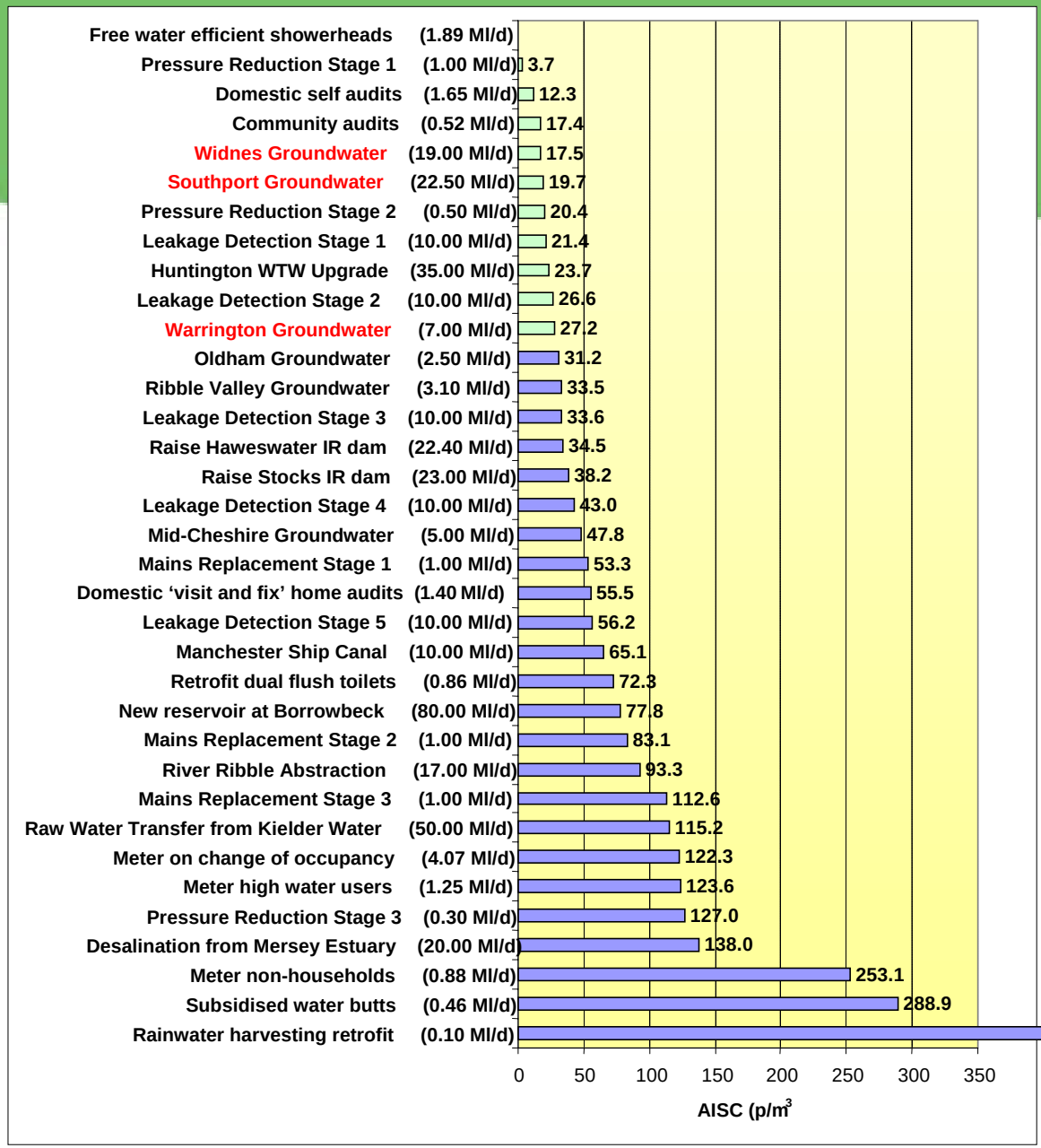
AISC for the Integrated Resource Zone



- Groundwater >50 ML/d "new water"
- Leakage reduction (24 ML/d)
- Water efficiency (5 ML/d)
- Metering (8% reduction)
- Can groundwater meet this challenge?

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Is there enough water available?

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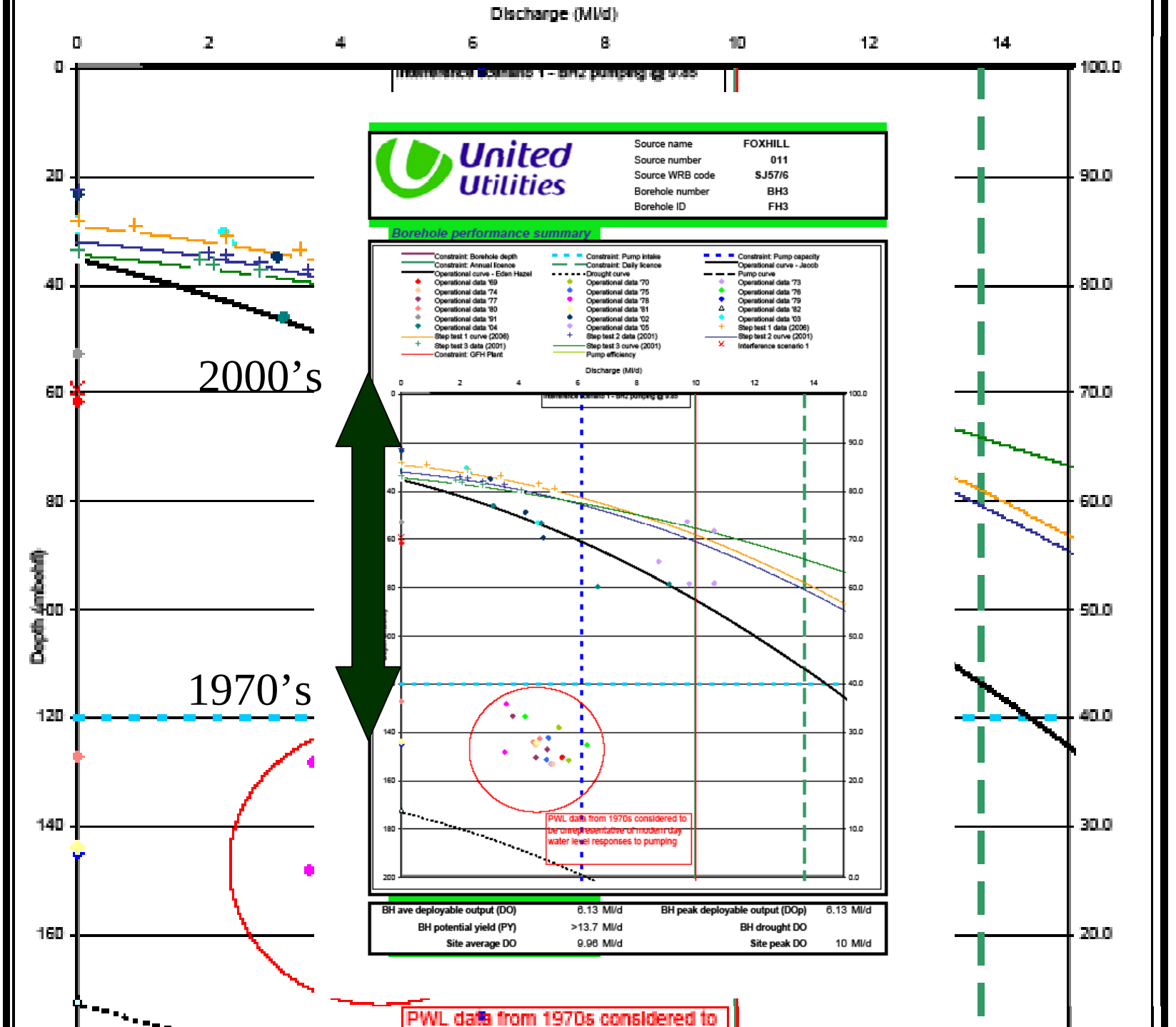
Discharge (Ml/d)
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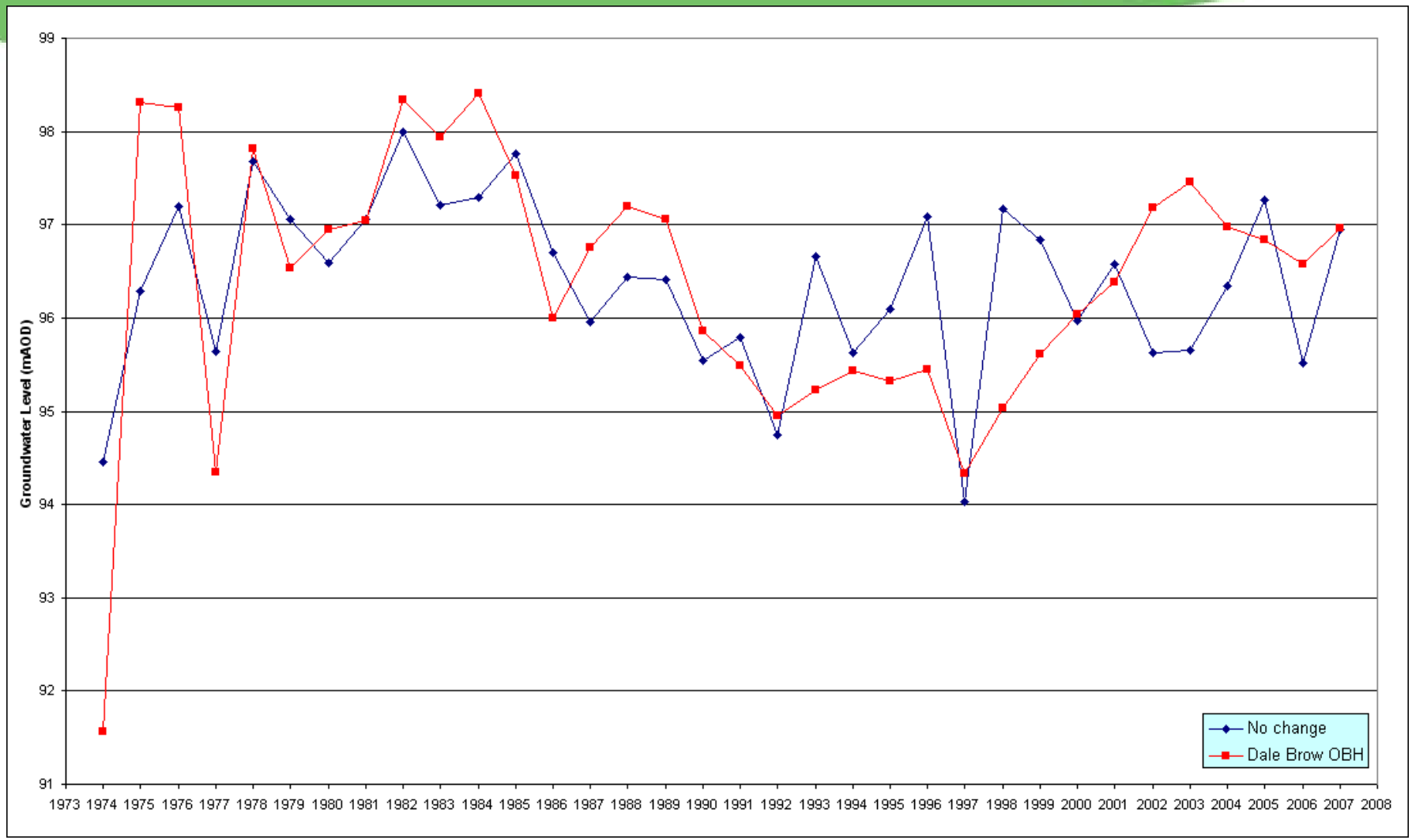
Source name FOXHILL
Source number 011
Source WRB code SJ57/6
Borehole number BH3
Borehole ID FH3
Borehole performance summary
2000's
1970's
Depth (mbgl)
PWL data from 1970s considered to be unrepresentative of modern day water level responses to pumping
BH ave deployable output (DO) 6.13 Ml/d
BH peak deployable output (DOp) 6.13 Ml/d
BH potential yield (PY) >13.7 Ml/d
BH drought DO
Site average DO 9.96 Ml/d
Site peak DO 10 Ml/d

Climate change effects?



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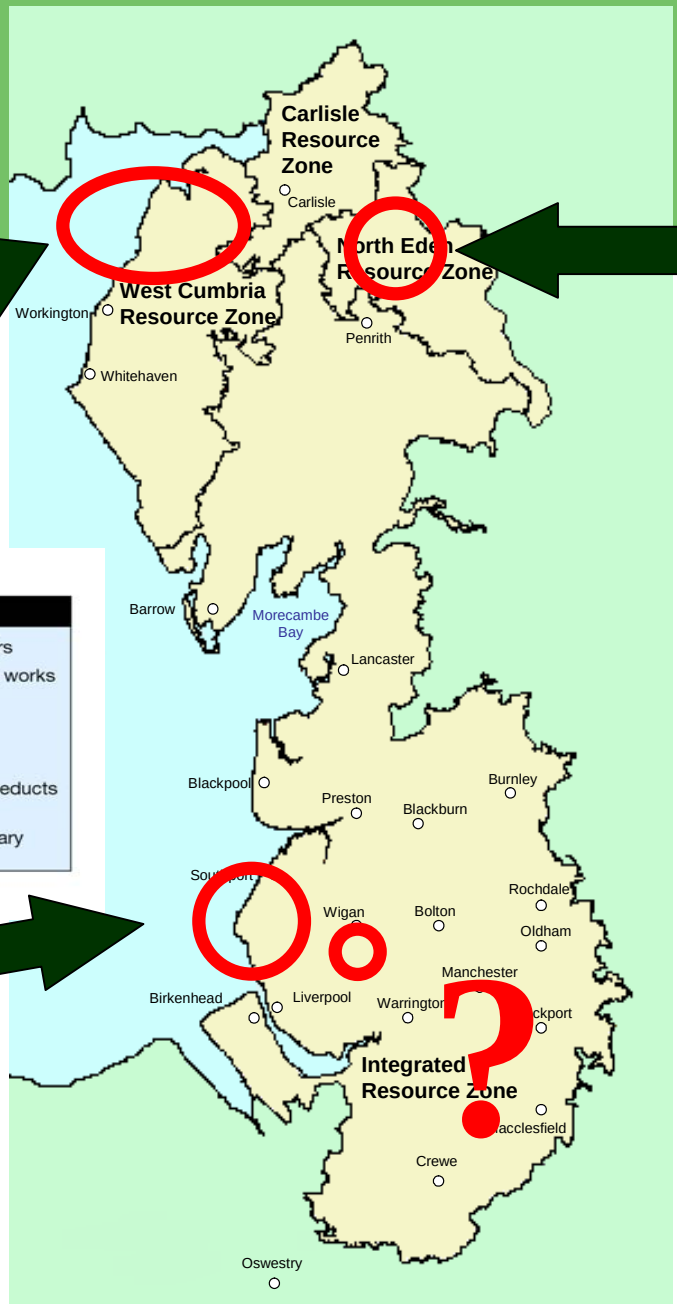
New GW sources in (AMP5/AMP6)

New sources in AMP4



Rationalisation and development AMP5/AMP6

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Back to the Future?...Implementing the WRMP

- Detailed appraisal of options
- Combined strategy – demand reduction + enhancements
- Magnitude of climate change scenarios
- Robust and reliable long-term solutions
- Groundwater development – historical legacies – GWQ
- WFD – uncertainty?
- Water resources management
- Sustainability, sustainability, sustainability!

- Thank you for listening!

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