



Central Plains Water Presentation by Howard Williams

Presentation contents

- Groundwater and consequent surface water and drainage issues
- Matters that require resolution and some suggested solutions and conditions

Key points in my evidence:

- There will be mounding, but has the applicant sufficiently assessed its magnitude and extent? No.
- There will be a complementary increase in the flows to spring-fed streams, and to Te Waihora; uncertainty of the flow magnitude
- If granted, specific conditions are required to mitigate these effects, should they become adverse

Applicant's evidence

- The modelling undertaken is missing a robust description of the precision and accuracy of the predictions.
- This leads to uncertainty in groundwater levels, surface flows and the need for mitigation

Evidence reviewed:

- Julian Weir – groundwater modelling
- Walter Lewthwaite – scheme structure
- Lowland Farmers Group (SWUG) – mounding & drainage issues
- Richard English – Waimakariri seepage
- Paul White – groundwater and surface water issues
- Peter Callander – quarrying issues
- Vince Bidwell – alternative modelling approach
- David Scott – audit of groundwater modelling

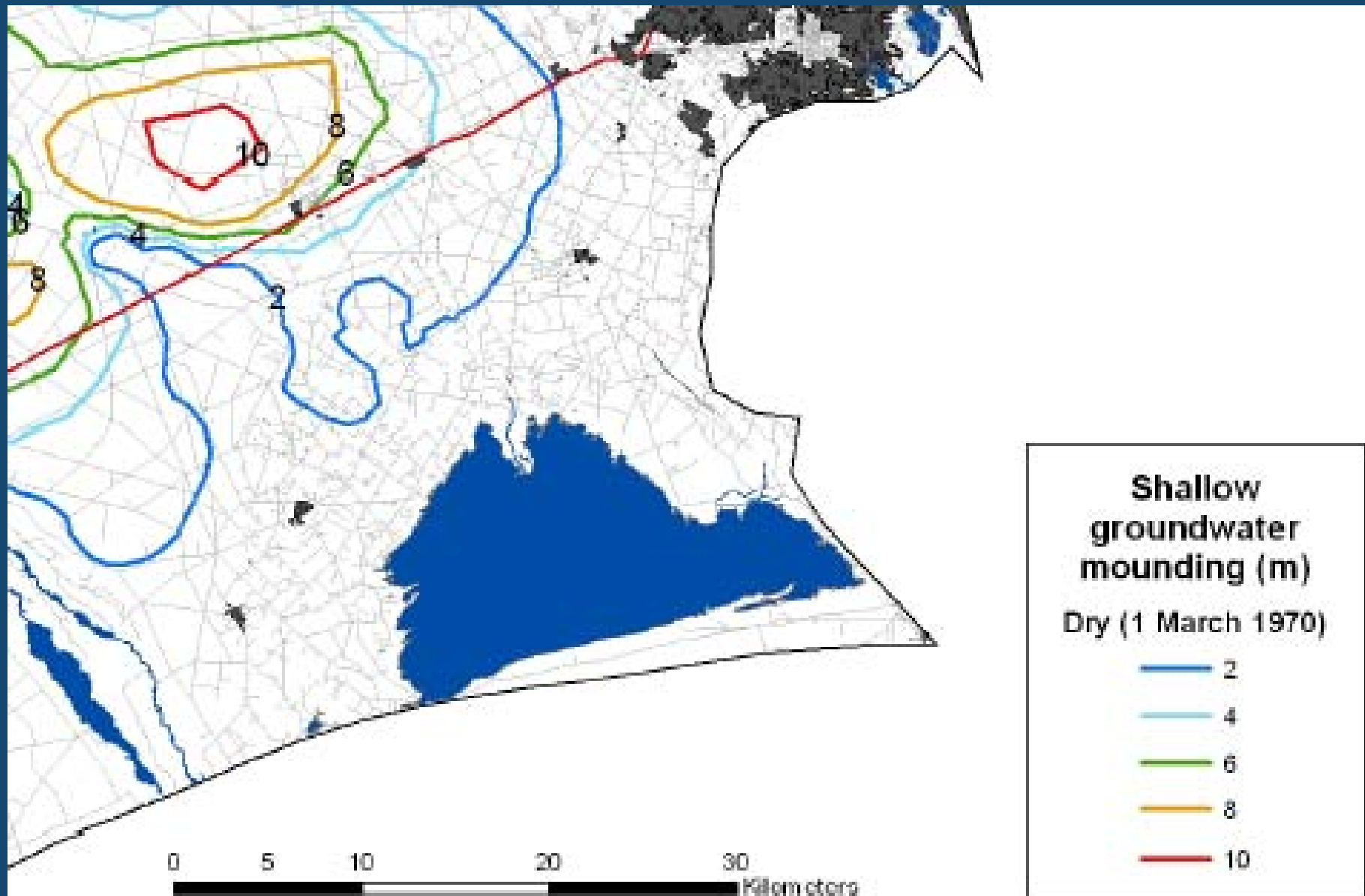
Unresolved matters

- How big will mounding get and how frequently?
- How will that mounding impact on streams and Te Waihora?
- To what extent will mounding affect farm drainage and farm activities?
- What could be done to deal with effects before they become adverse?
- When should such mitigation be carried out (seasonal trigger levels)?

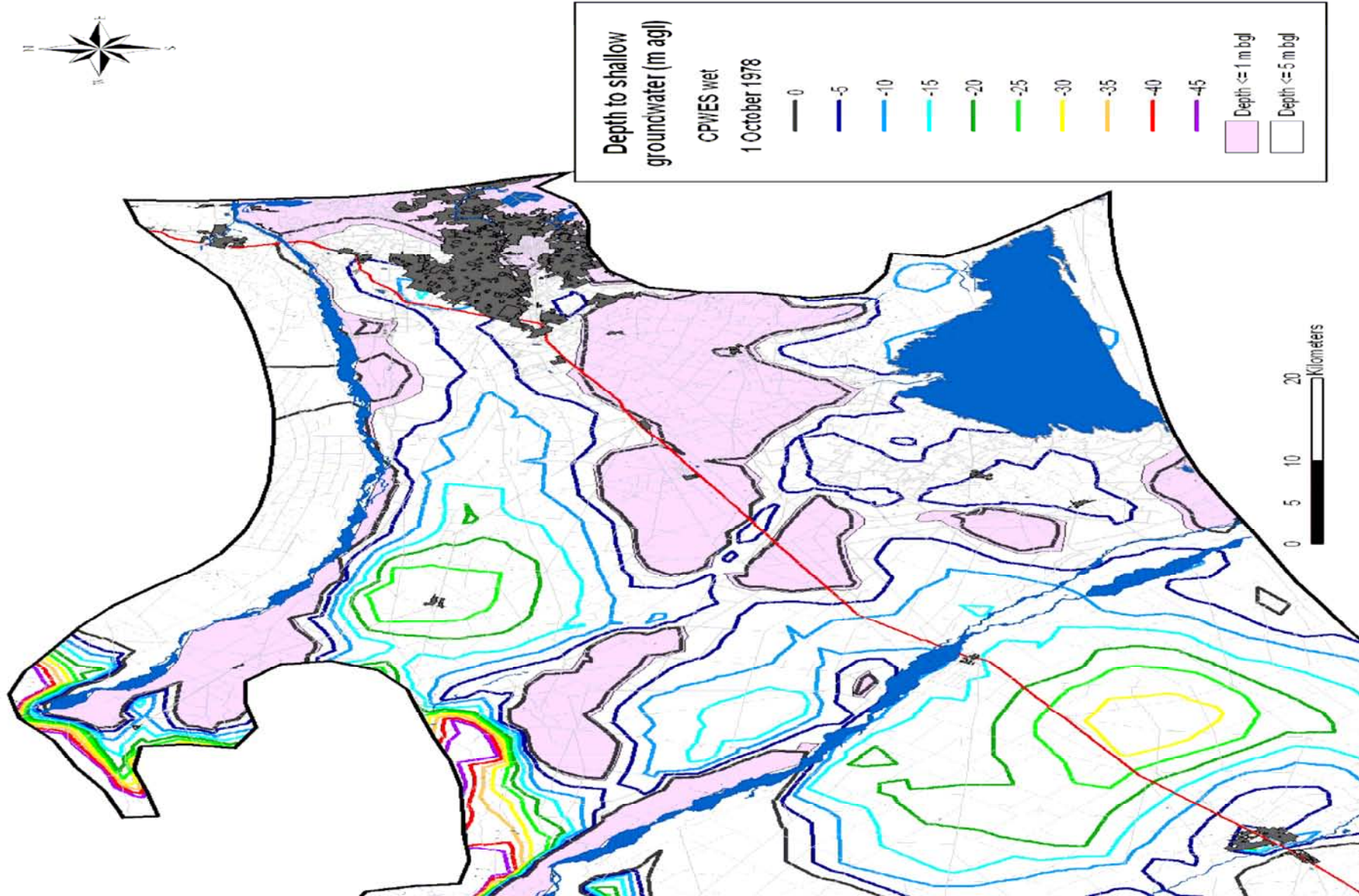
Mounding (1)

- Mounding greatest at locations distant from the major rivers and the lower part of the Selwyn River valley
- Mounding close to Te Waihora may be of lesser magnitude than up-gradient, but groundwater levels near the lake are closer to surface and minor changes in level are critical to farm management

Mounding (2)



Mounding (3): Depth to groundwater



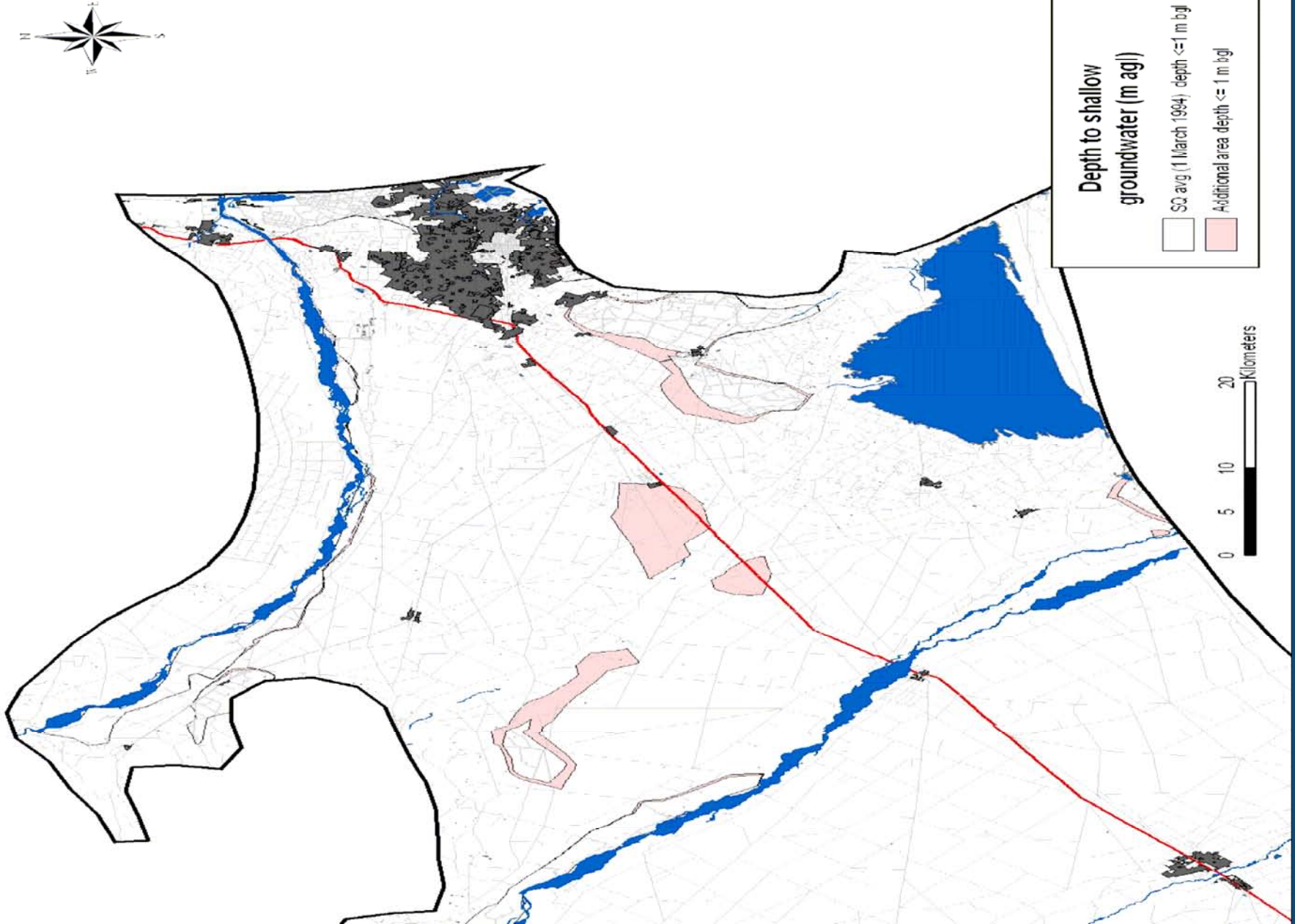
Mounding (4): Adverse mounding effects

- Concern from farmers & residents (working the land, quarrying, wastewater and stormwater disposal)
- Areas of concern (Southbridge Water Users Group area, Halswell, Burnham, upper Selwyn River valley, adjacent to Waimakariri River)

Mounding (5)

- Uncertainty associated with magnitude and extent of mounding
- I consider an eigen model approach (Bidwell) or simple numerical flow modelling (Scott) more precise and accurate at predicting and verifying mounding, its location and consequent depth to groundwater

Mounding (6)



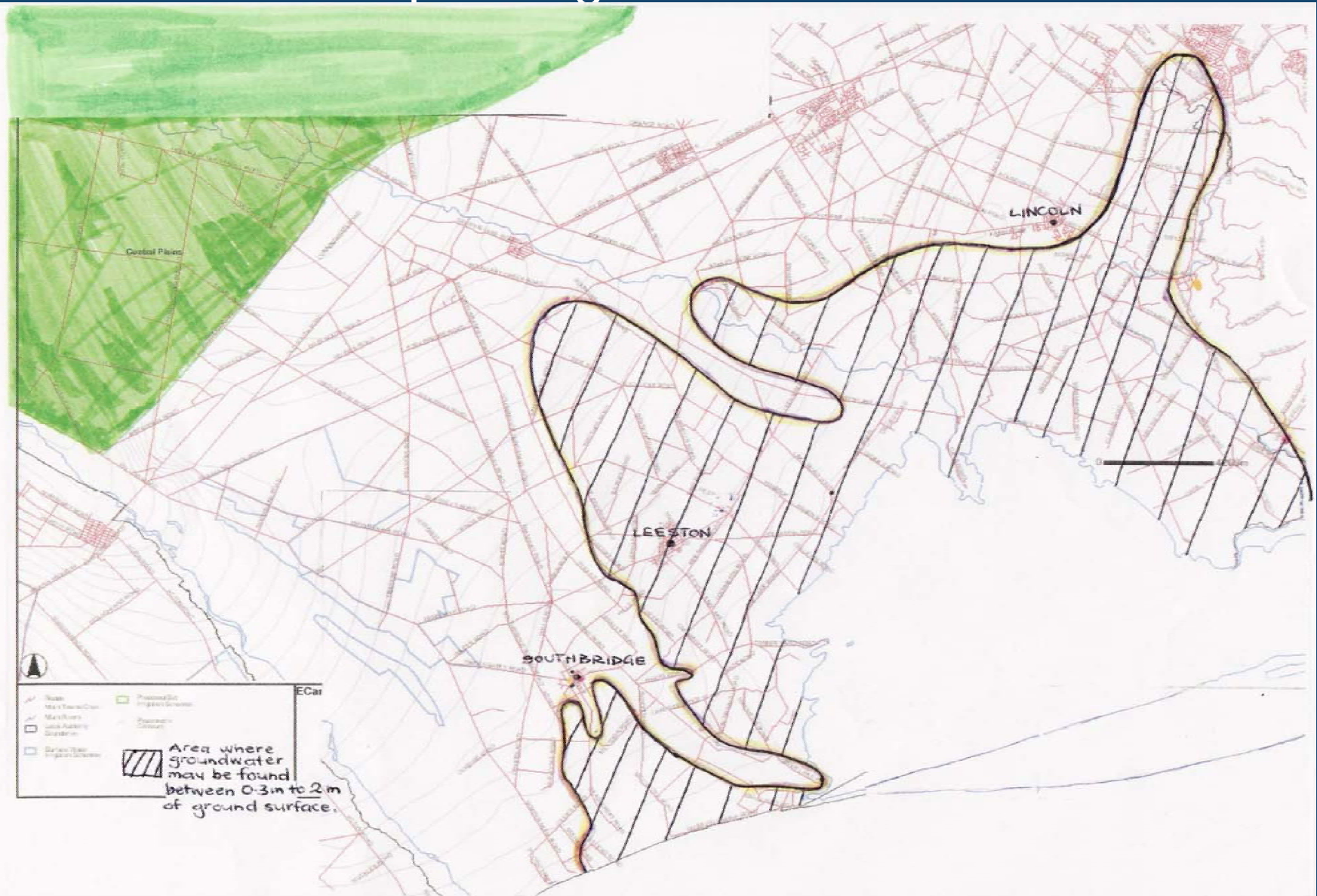
Mounding (7): Dealing with mounding

If mounding of the magnitude and area as suggested by the applicant occurs, what can be done about it?

- Monitoring and model verification
- Development of seasonal trigger levels

Some areas (Southbridge to Leeston)
already have high levels

Depth to groundwater



Surface flows

- Mounding induces surface flow
- Discharge to Te Waihora
- Increased need for opening Te Waihora

- Concern about the direct discharges to the ocean

Conditions (if granted)

- Monitoring condition: GW & SW
- Model verification condition leading to erection of seasonal trigger levels
- Groundwater trigger level condition
- Lake opening condition

Conclusions

If granted, in my opinion, the applicant should bear the responsibility to:

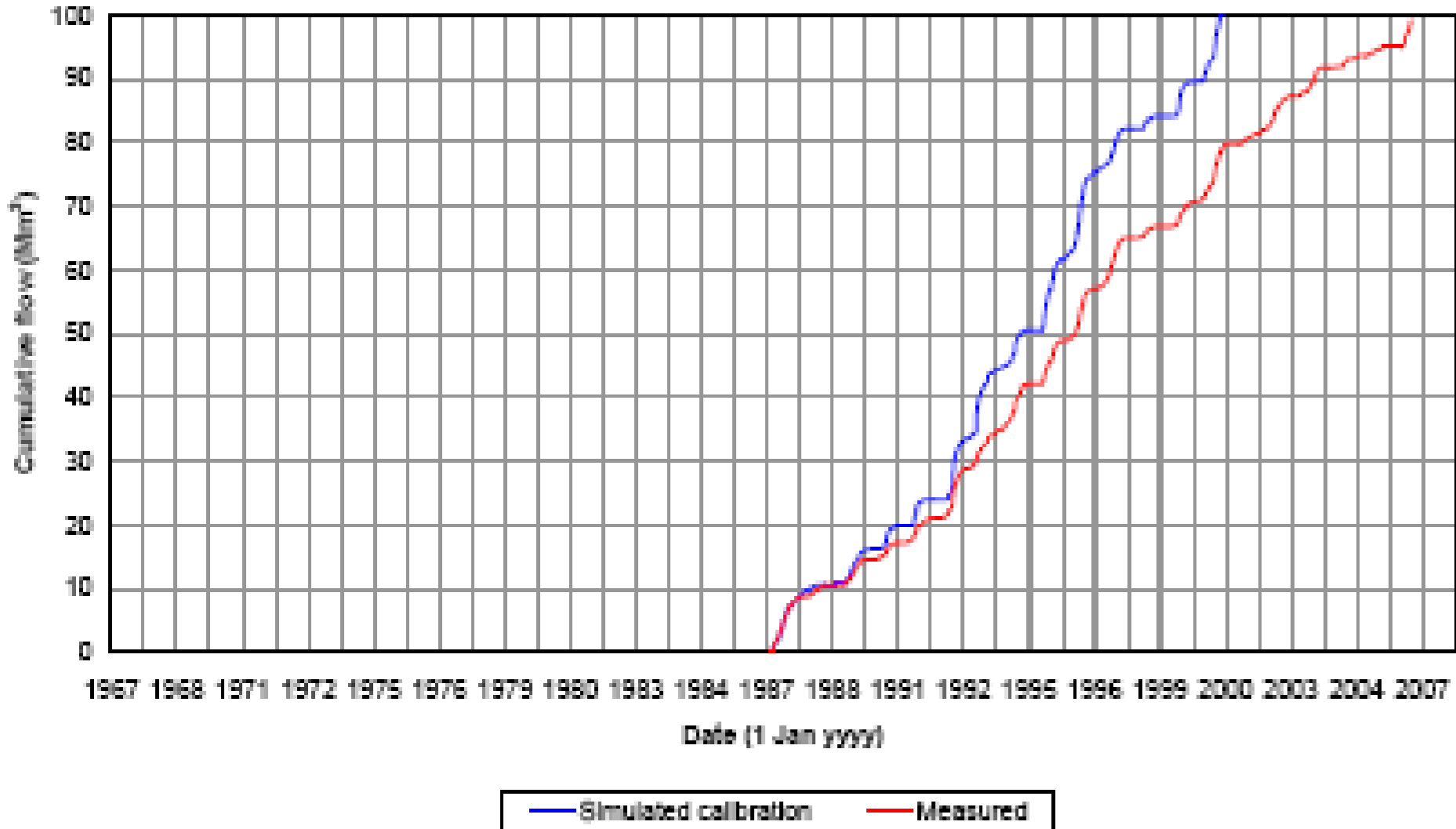
- use Council and additional monitoring to verify their predictions
- conform to trigger levels developed to constrain mounding if these effects adversely impact on the community
- facilitate maintenance and upgrading of drains, ocean discharge points and other surface water bodies, where appropriate

Effects on Te Waihora

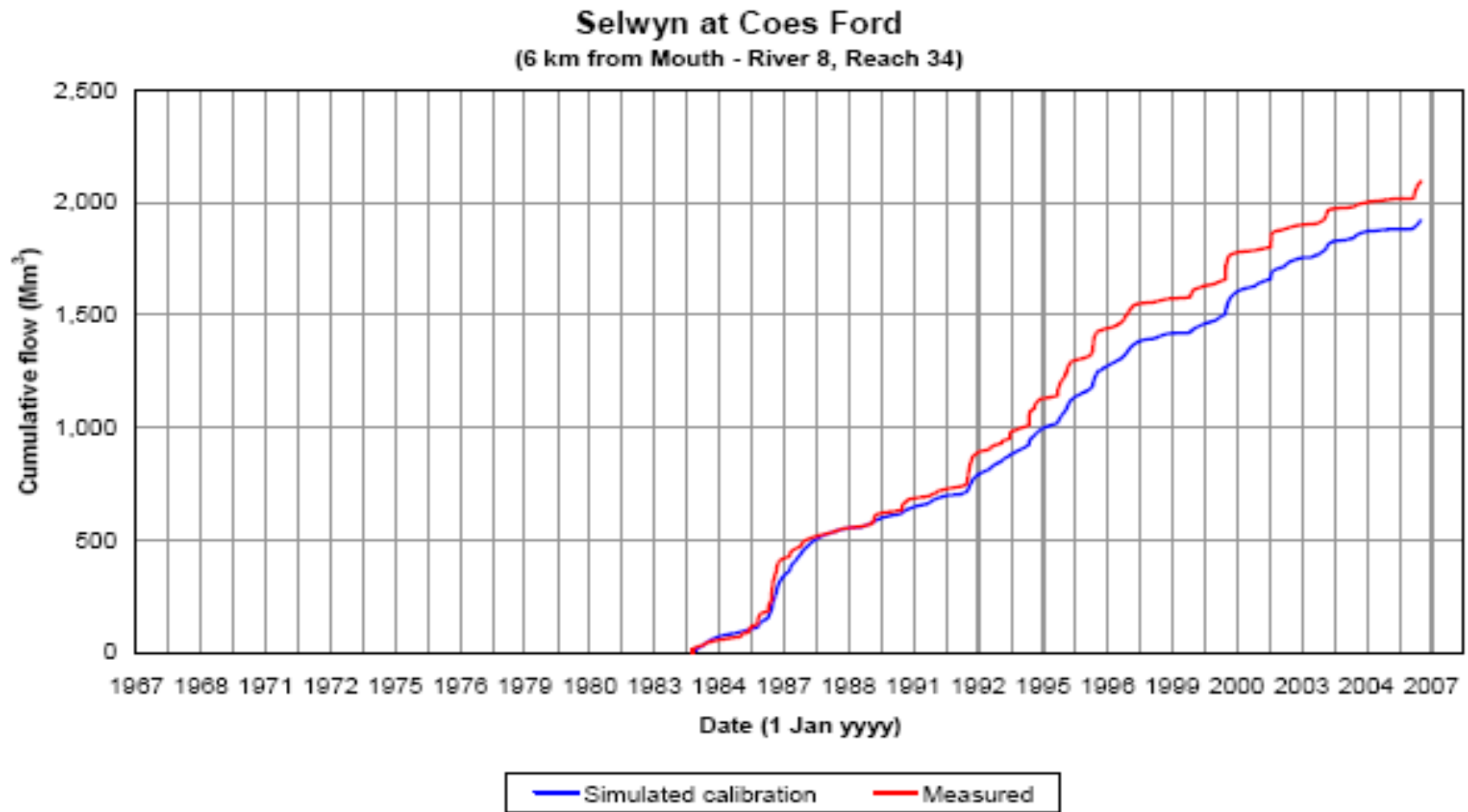
- Increase in surface flows into the lake will increase the need for opening;
- How will the costs of opening be apportioned between 'natural' and CPW-induced opening?

Modelled and monitored river flows (2)

Doyleston Drain at Weir
(1 km from Mouth - River 18, Reach 8)



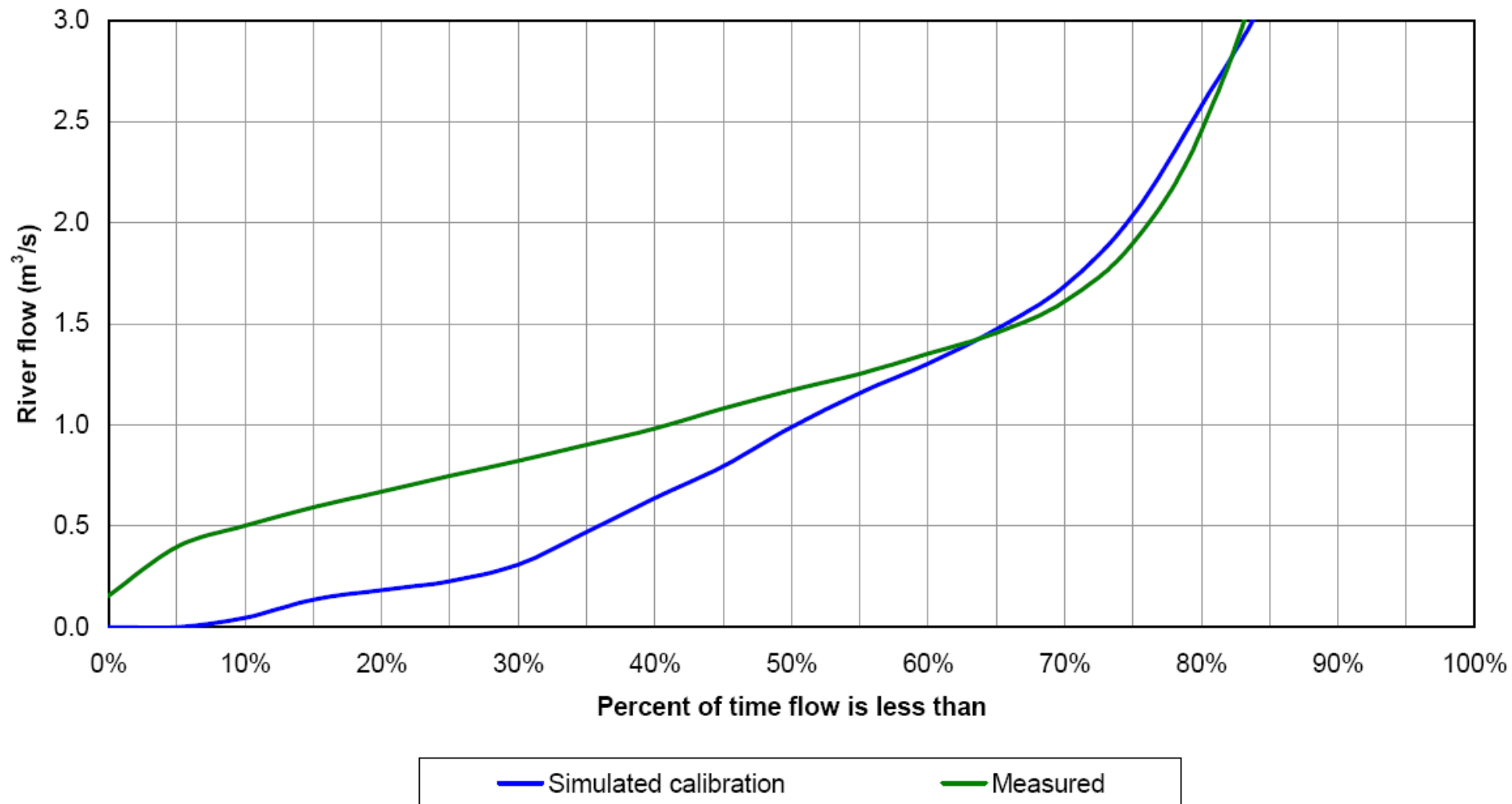
Modelled and monitored river flows (3)



Presentation derived from supplementary evidence

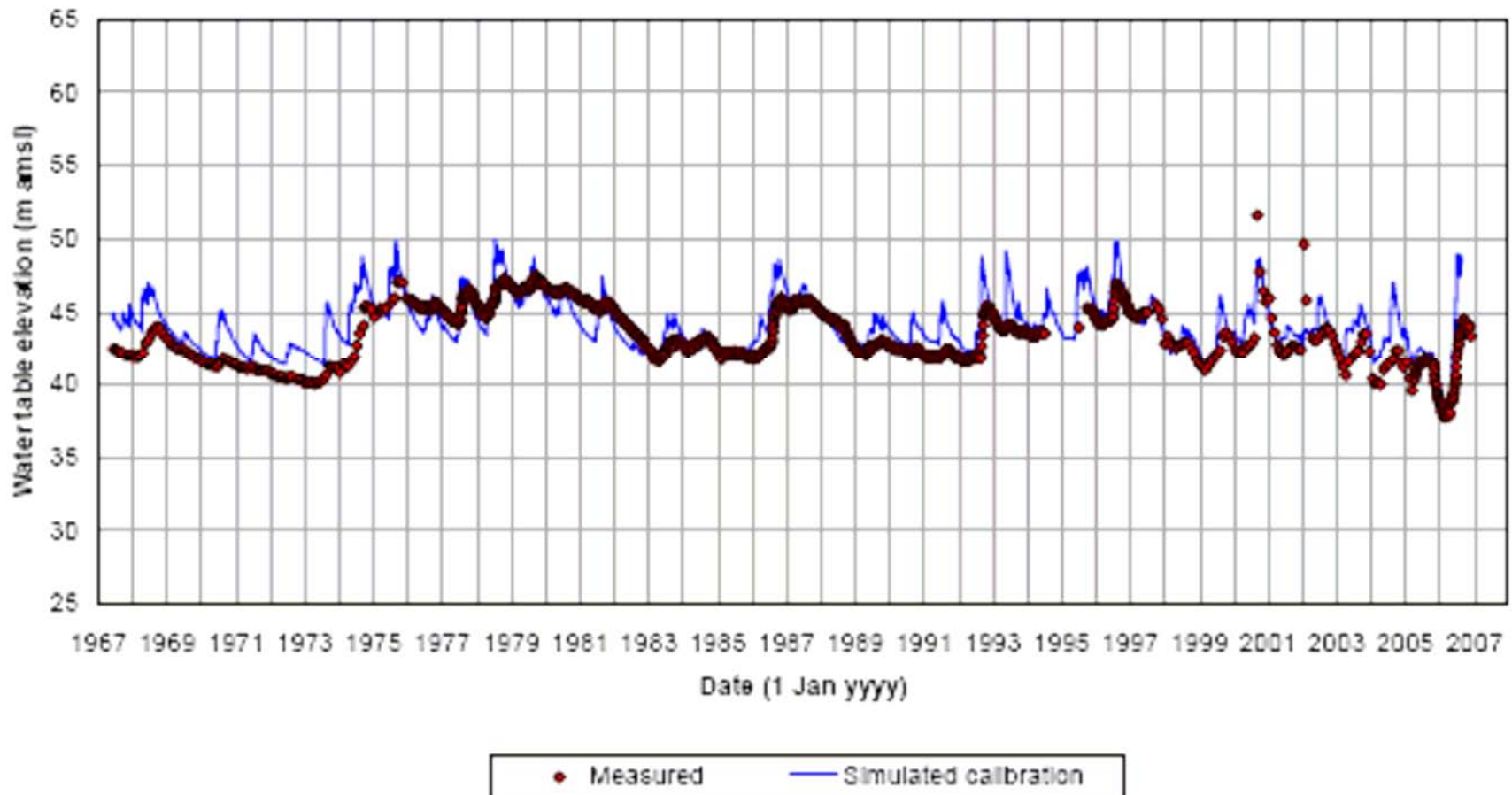
Relationship between modelled and measured flows

Selwyn River at Coes Ford
(6km from mouth - River 8, Reach 34)

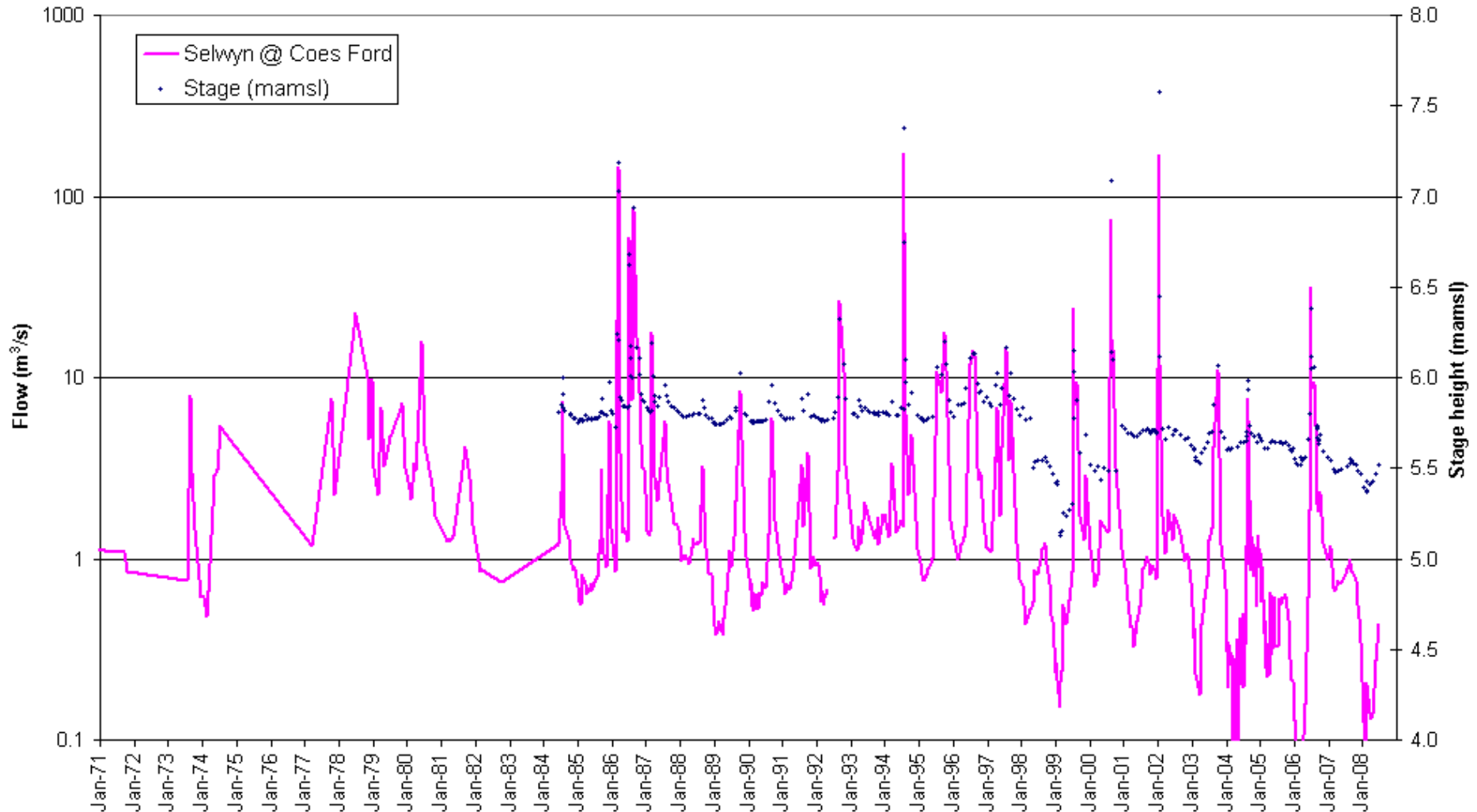


Relationship between modelled and monitored groundwater levels

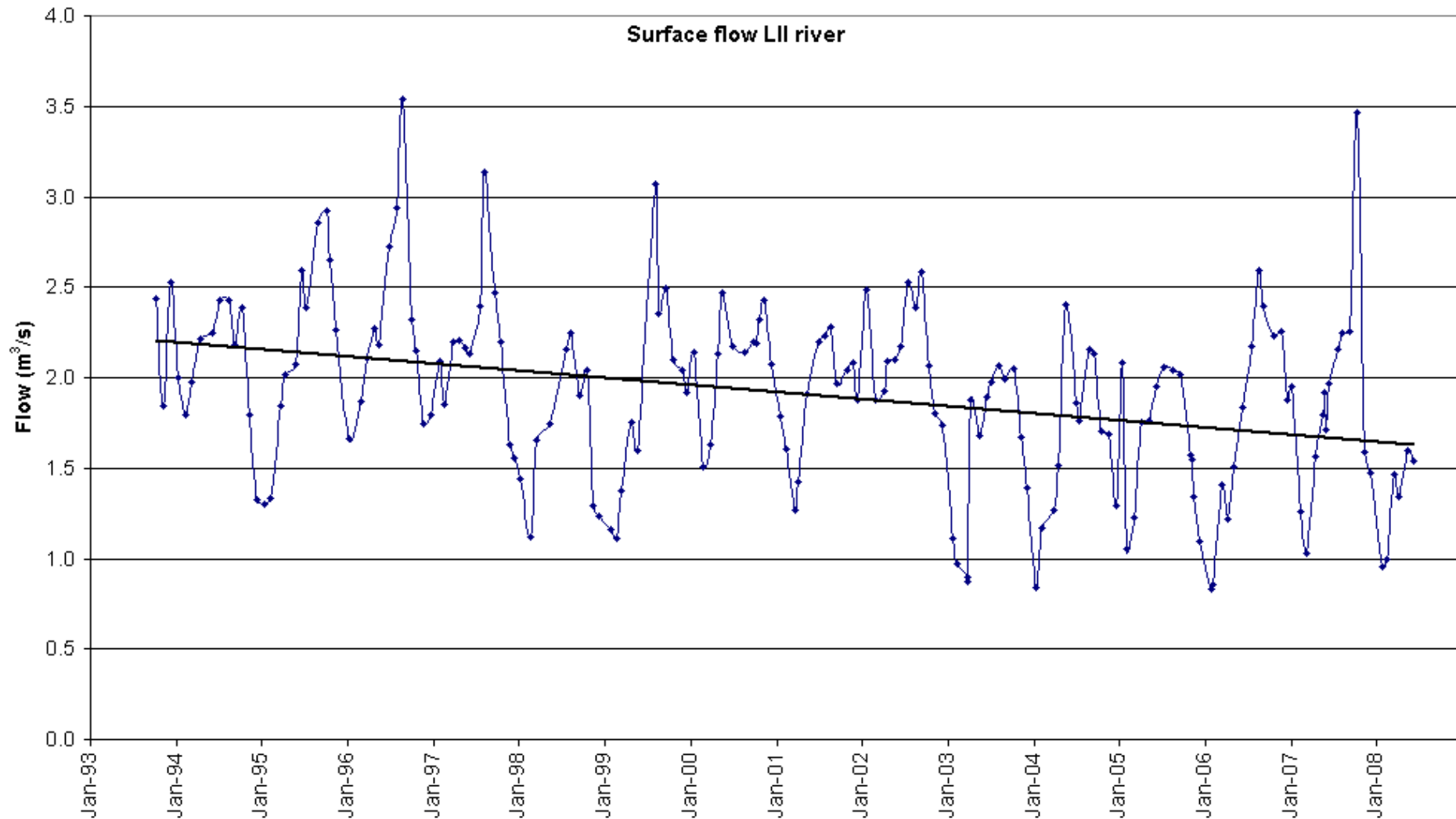
L36/0142
(Zone 13, Aquifer 1)



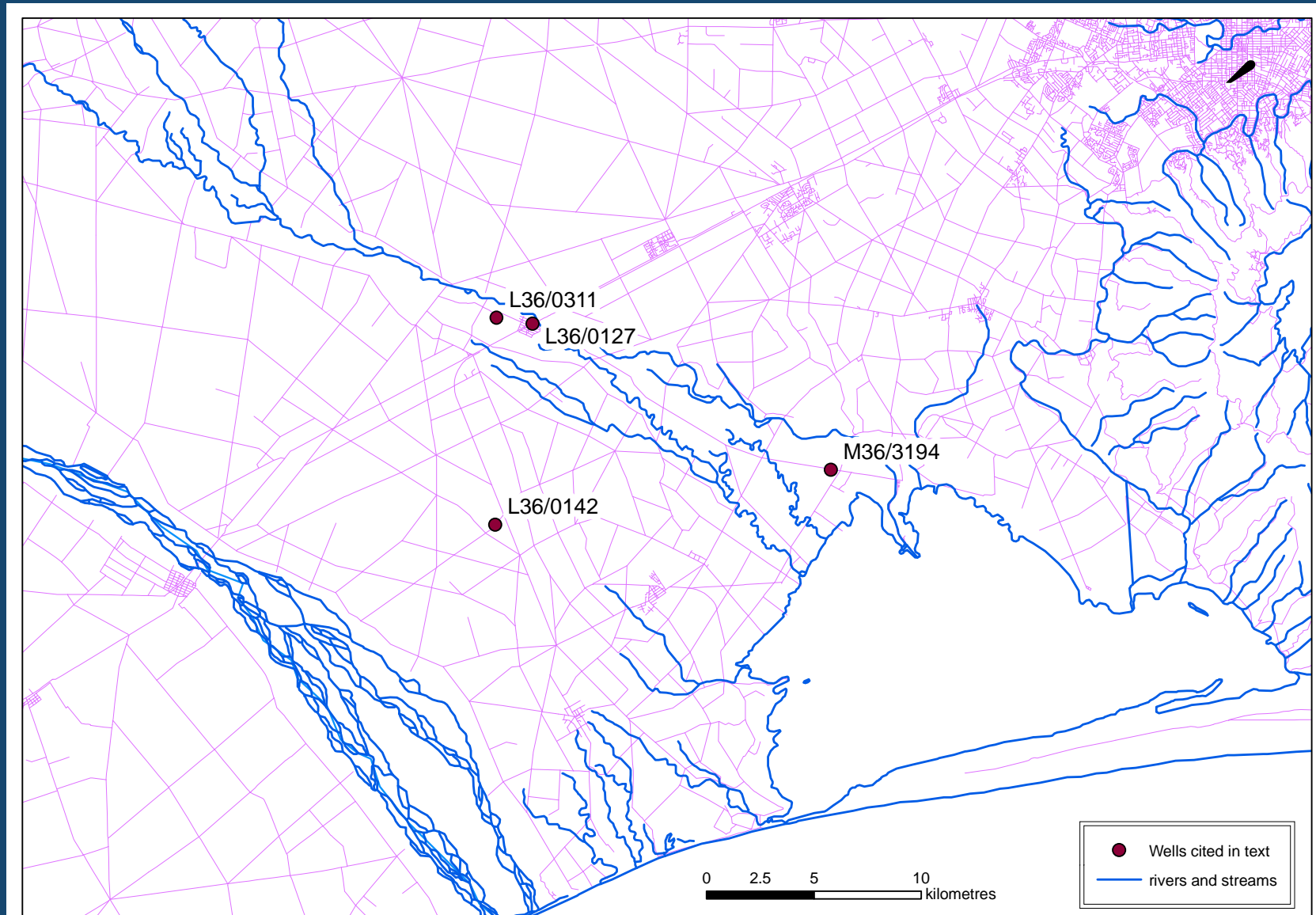
Selwyn River flows



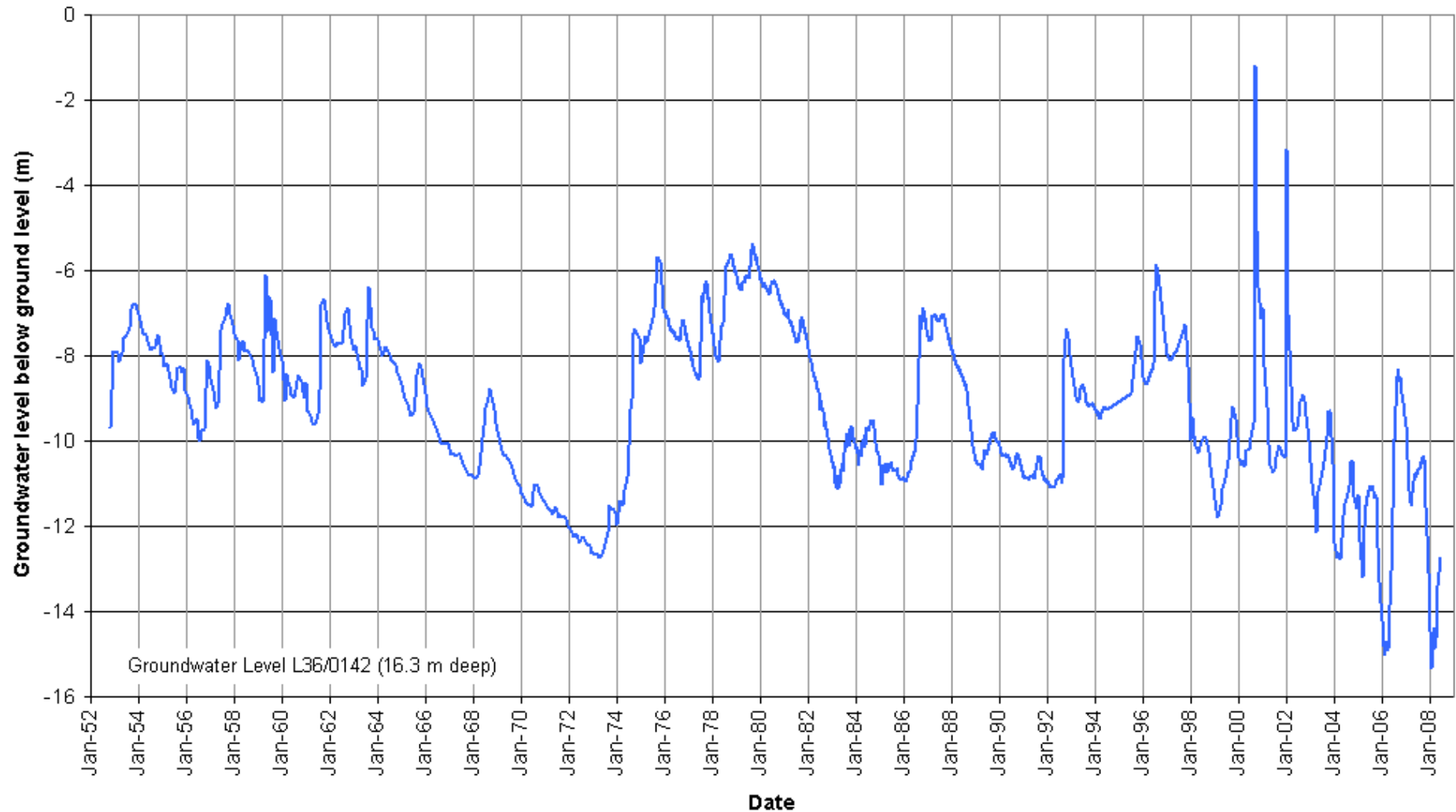
LII River flows



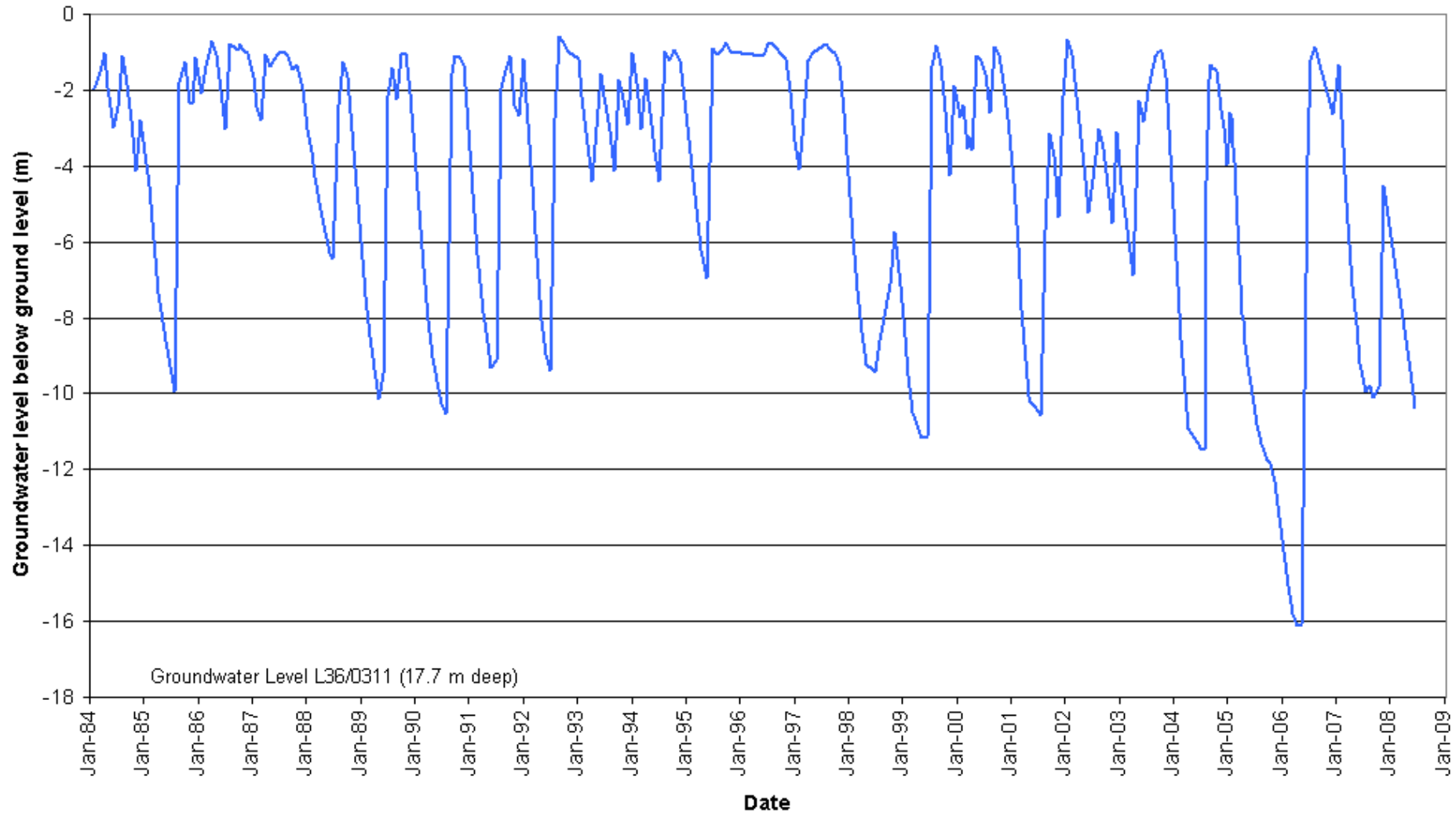
Groundwater levels



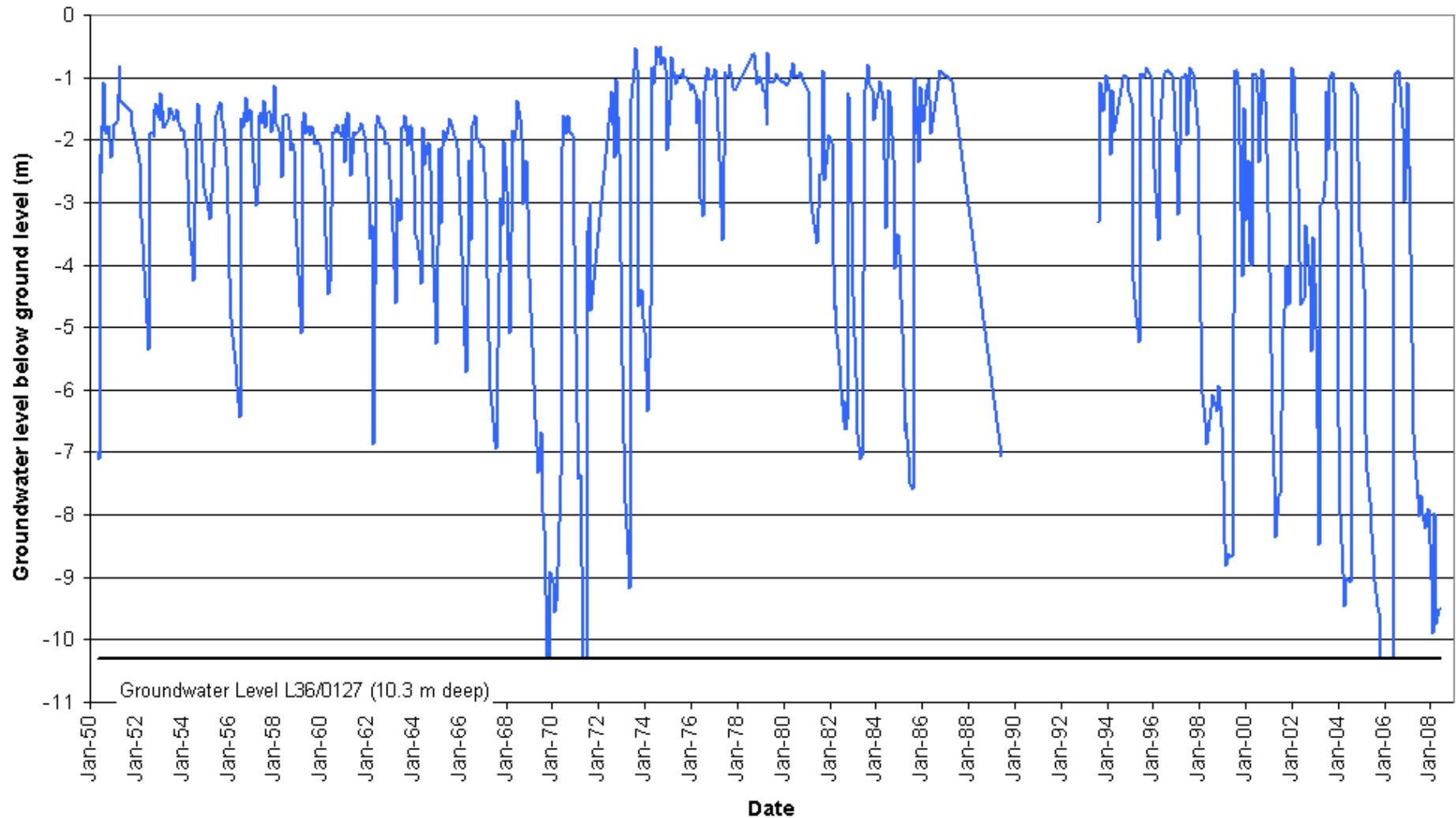
Groundwater levels (1): L36/0142



Groundwater levels (2): L36/0311



Groundwater levels (3): L36/0127



Groundwater levels (4): M36/3194

