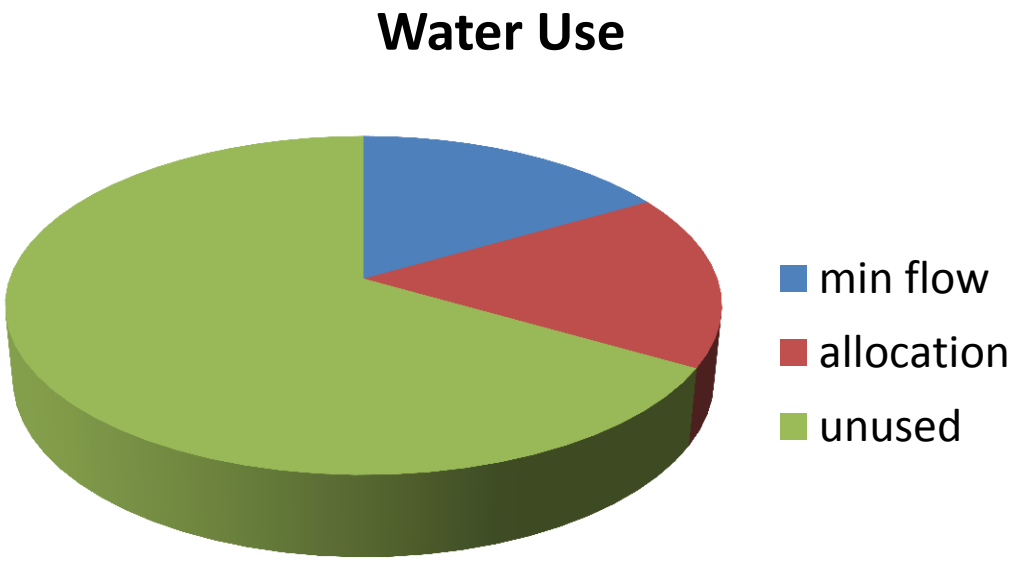
New Water

Why do we need ‘new’ water?

- Decreasing irrigation supply security
- Decreasing irrigation supply volume
- Decreasing habitat and recreational values
- Increasing risk of extreme conditions
- Increasing divergence from ‘natural’ conditions – extreme low flows
- Depleted groundwater reserves

Catchment water

- Each source or use of water interacts with other uses or flow patterns.
- It is prudent to assess the whole catchment hydrology, albeit complex



Objectives

- Maintain or increase irrigation quantity and reliability
- Maintain or increase ecology, cultural use, recreational use and habitat

- We need to manage the water resources for and by all users.

New Water

New water is principally from

- Water storage
- Aquifer recharge
- In some areas from movement of water from one sub catchment to another

Water storage

- Bigger is typically cheaper
- Dammed valleys cheaper than cut and fill
- Bigger has reticulation, environmental, and sheer cost impediments
- Farm scale storage more $/m³ but more do-able

Managed Aquifer Recharge Feasibility Study

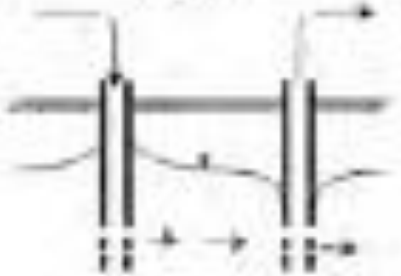
Report prepared for

ENVIRONMENT CANTERBURY

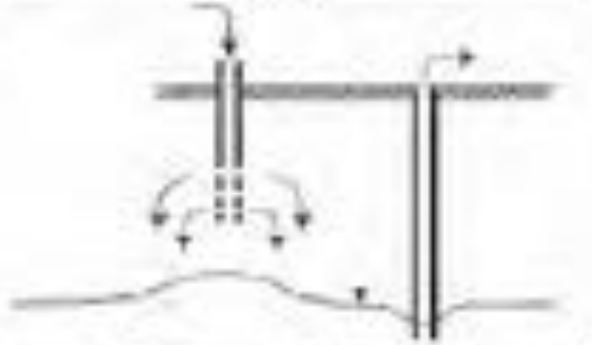
- Draft v4
- 29 July 2010

ASR

ASTR

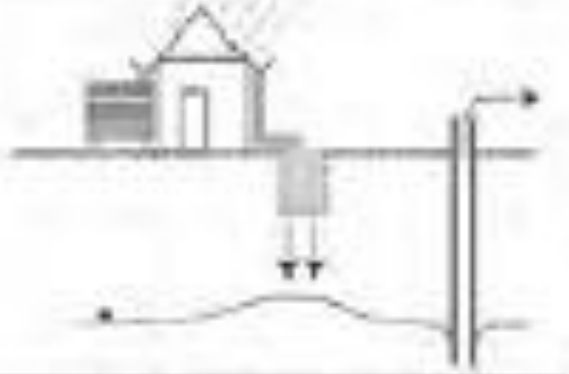


Dry Well



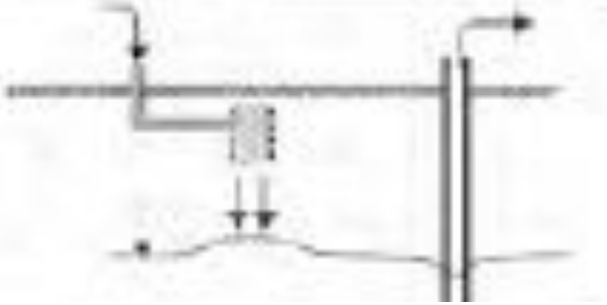
Percolation Tank

Rainwater Harvesting



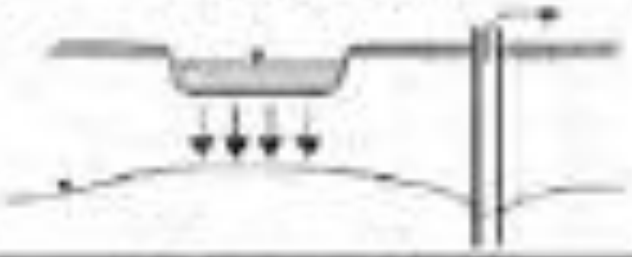
Bank Filtration

Infiltration Gallery

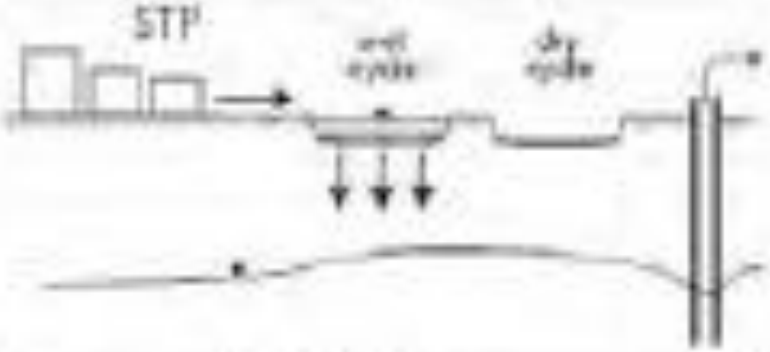


Dune Filtration

Infiltration Pond



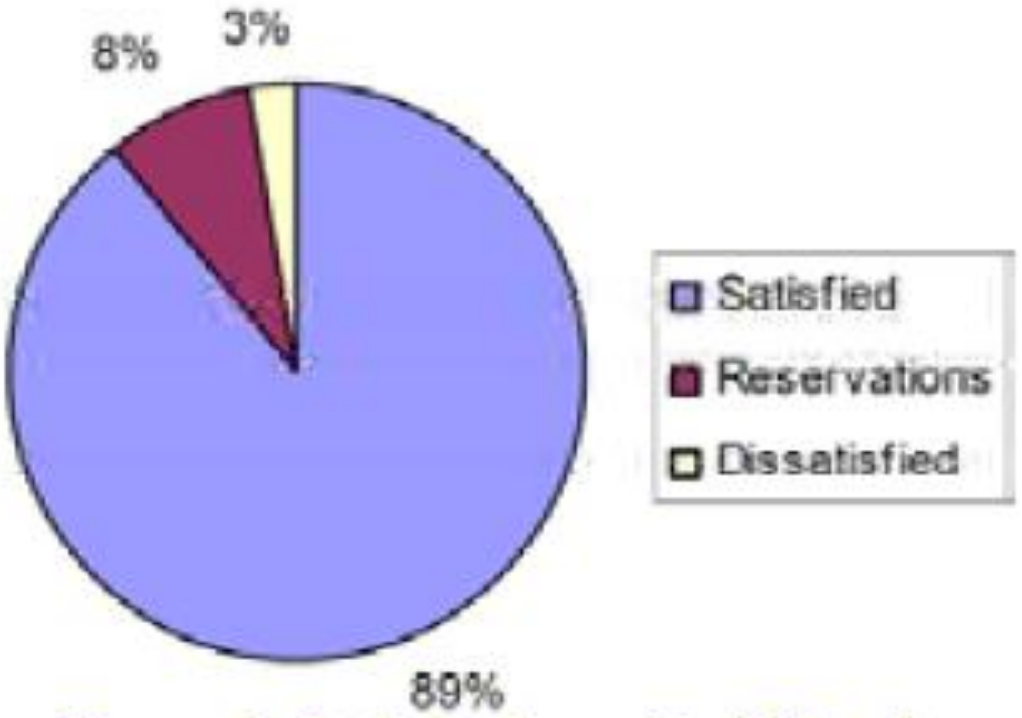
Soil Aquifer Treatment



Underground Dam

Sand Dam

Recharge Releases



- **Figure 4. Satisfaction with ASR schemes.**
  (Source: AWWA, 2002).

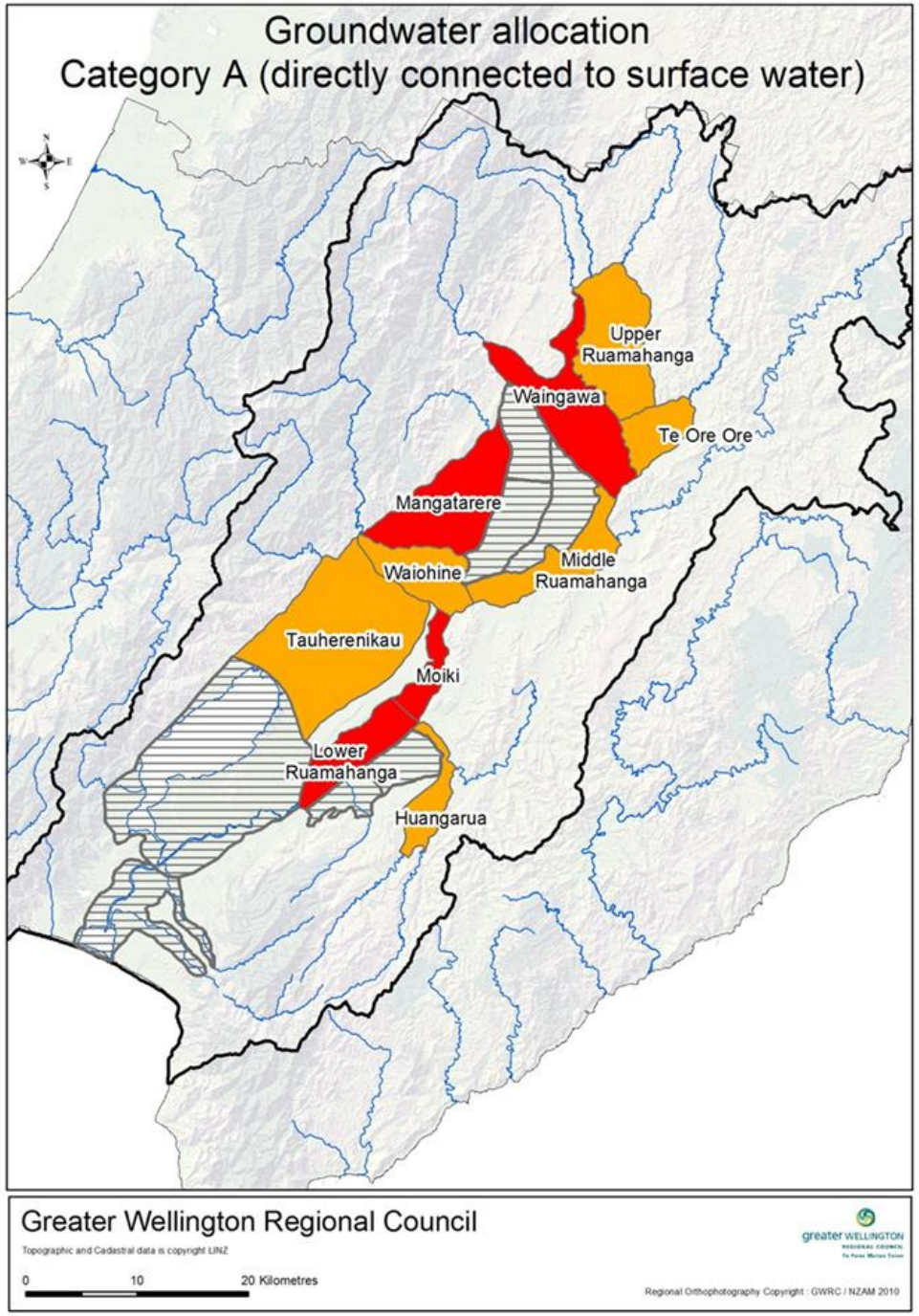
SKM report extracts

Infiltration basins

Infiltration basins and channels are typically constructed off-stream. Surface water is diverted into these structures and allowed to infiltrate (generally through the unsaturated zone) to the underlying water table. This recharge method is extensively used within the USA for purposes of 'water banking' within alluvial aquifers that have been extensively impacted due to predominantly agricultural and horticultural abstraction. The methods for determining site selection and system design are widely documented (e.g. Bouwer and Rice, 1989).

8. Conclusions

Managed aquifer recharge is at the leading edge of integrated water management, presenting opportunities for conjunctive management of surface water and groundwater resources, and producing fit-for-purpose water supplies. MAR not only provides an effective means of storing water and enabling better management of available resources, but it can also provide environmental benefits to groundwater dependent ecological systems.



Allocation issues

No relevant limit for this unit

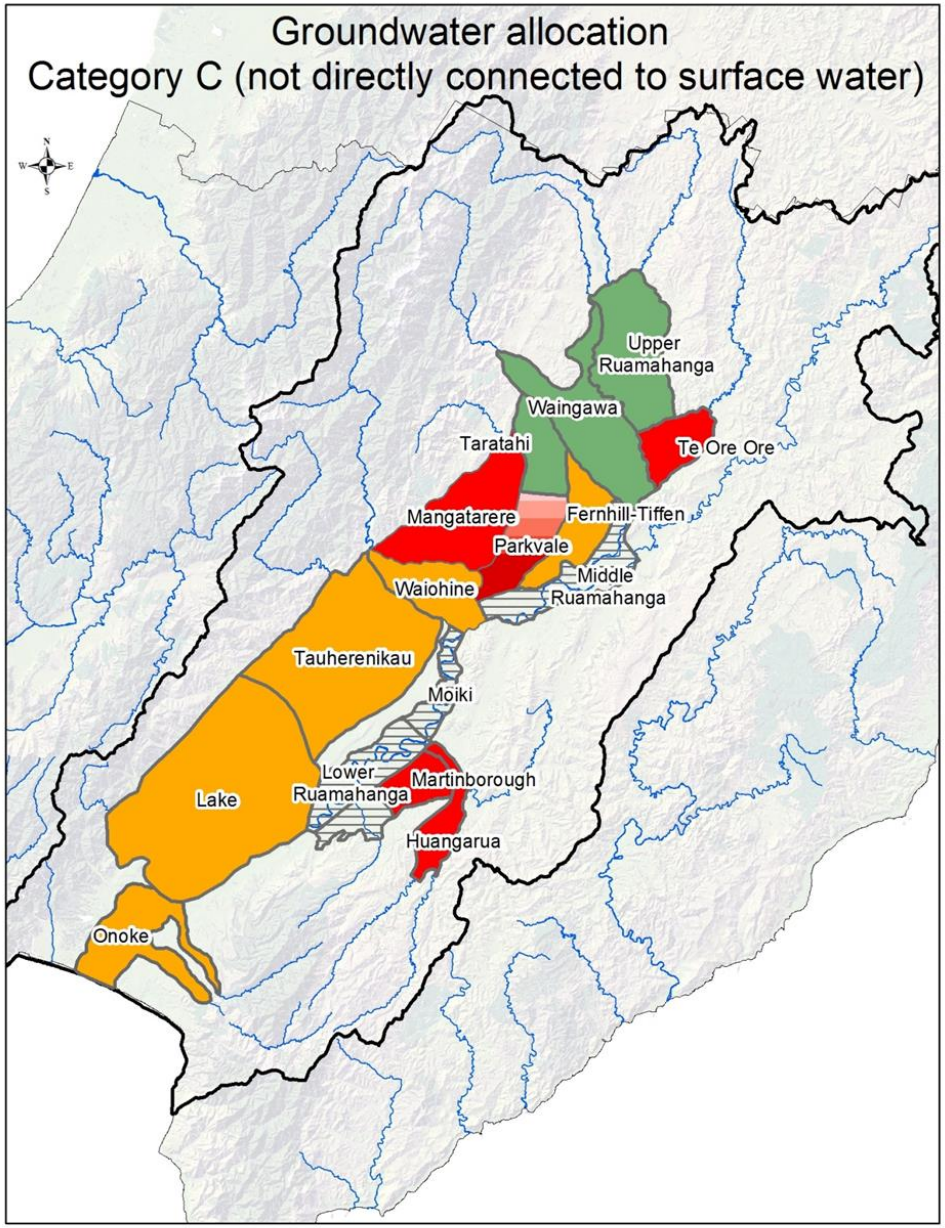
Allocation is less than 50% of the limit

Allocation is between 50% and 100% of the limi

Allocation is at or above 100%

Allocation is well above 100%

Groundwater allocation
Category C (not directly connected to surface water)



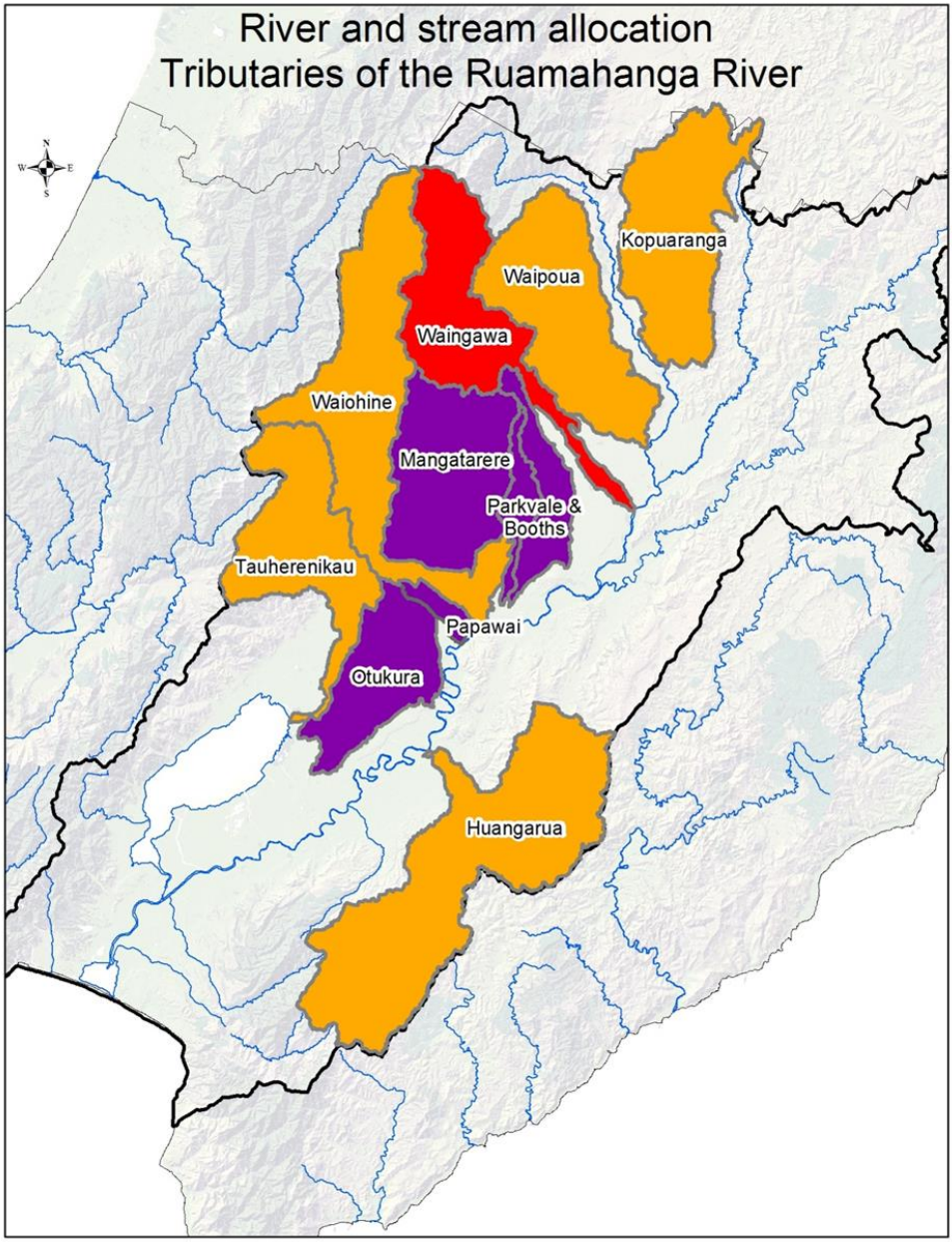
Greater Wellington Regional Council

Topographic and Cadastral data is copyright LINZ

0 10 20 Kilometres

Regional Orthophotography Copyright : GWRC / NZAM 2010

River and stream allocation
Tributaries of the Ruamahanga River



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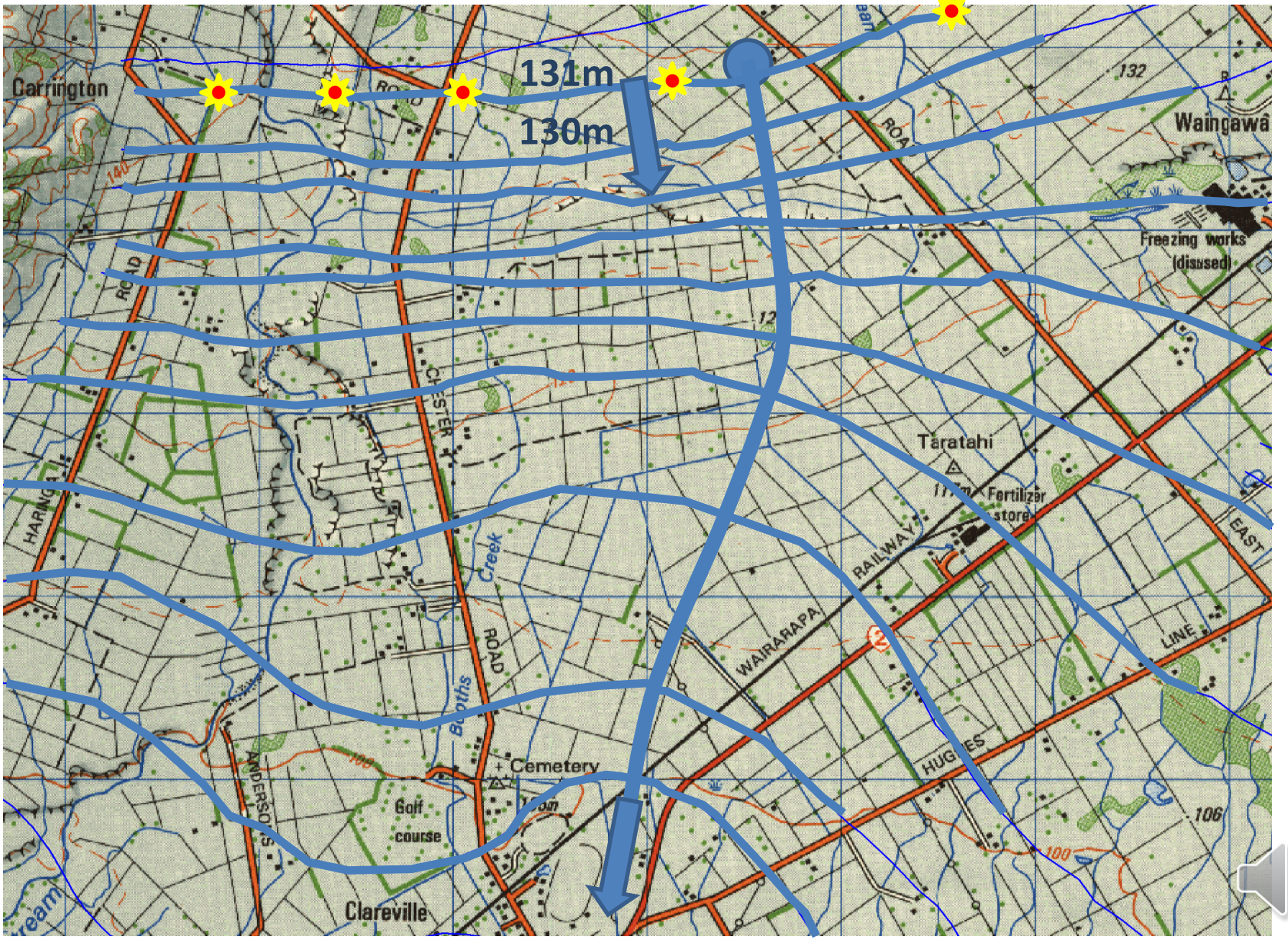
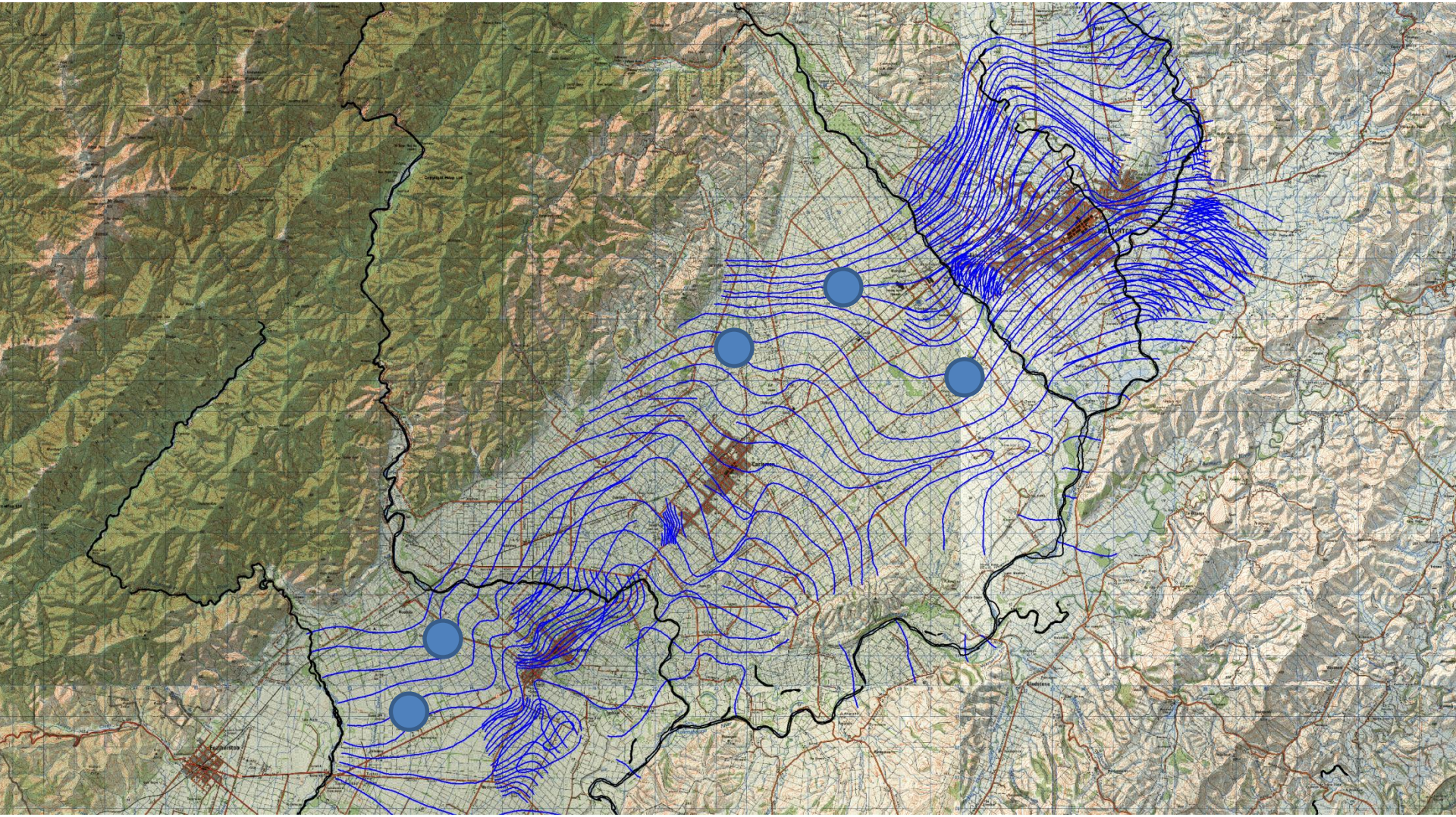
0 10 20 Kilometres

Regional Orthophotography Copyright : GWRC / NZAM 2010

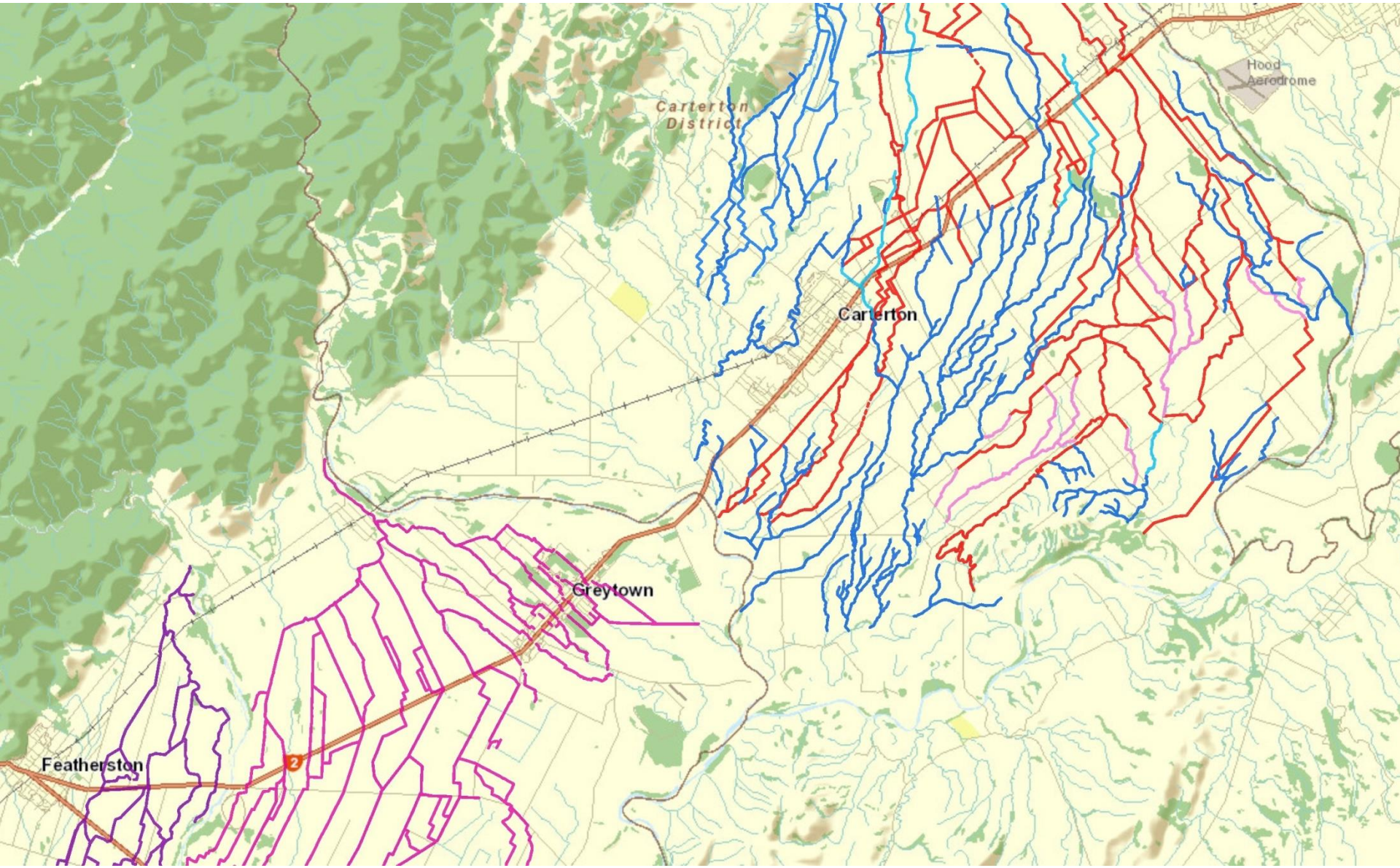
Piezometric contours



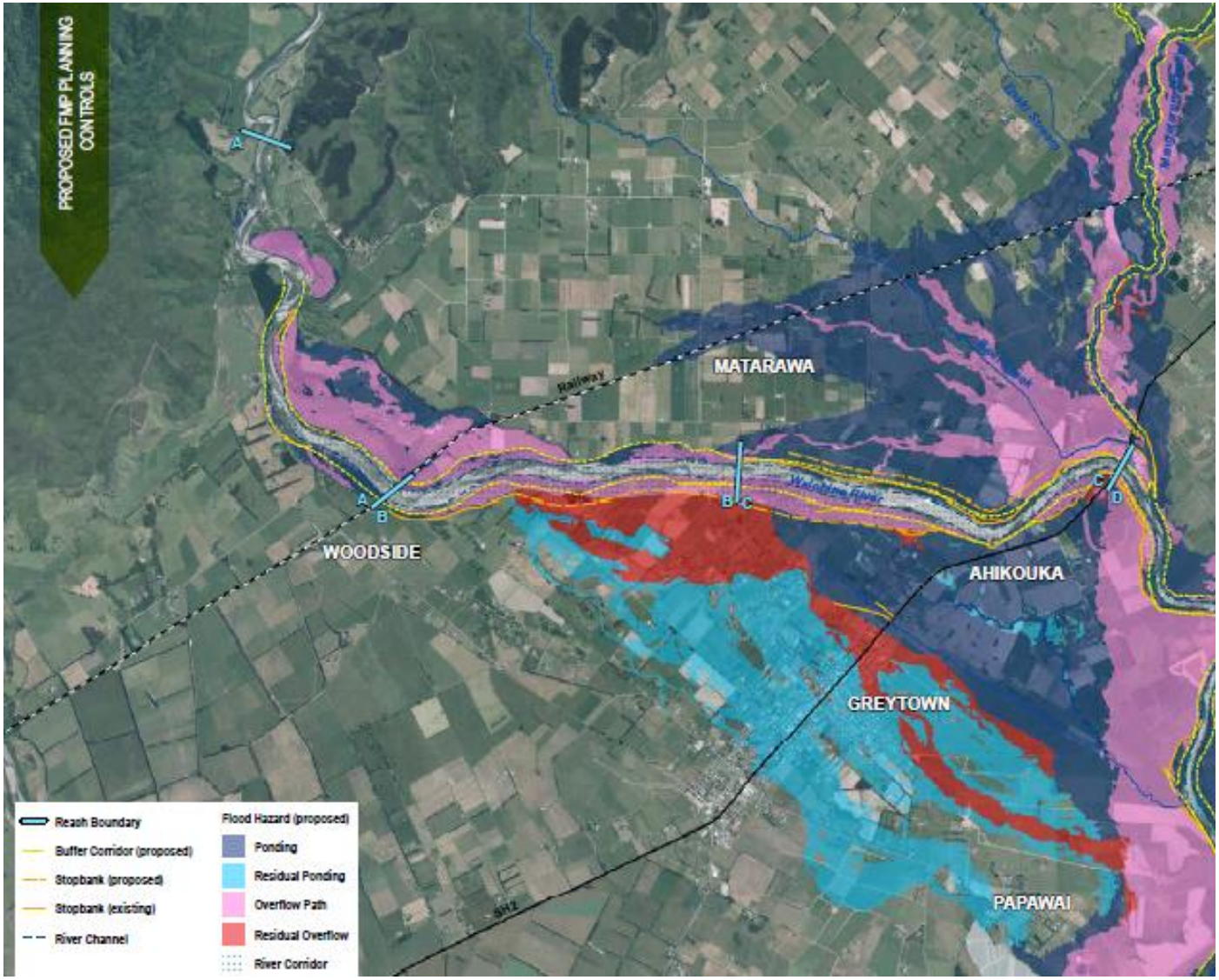
Mapping groundwater

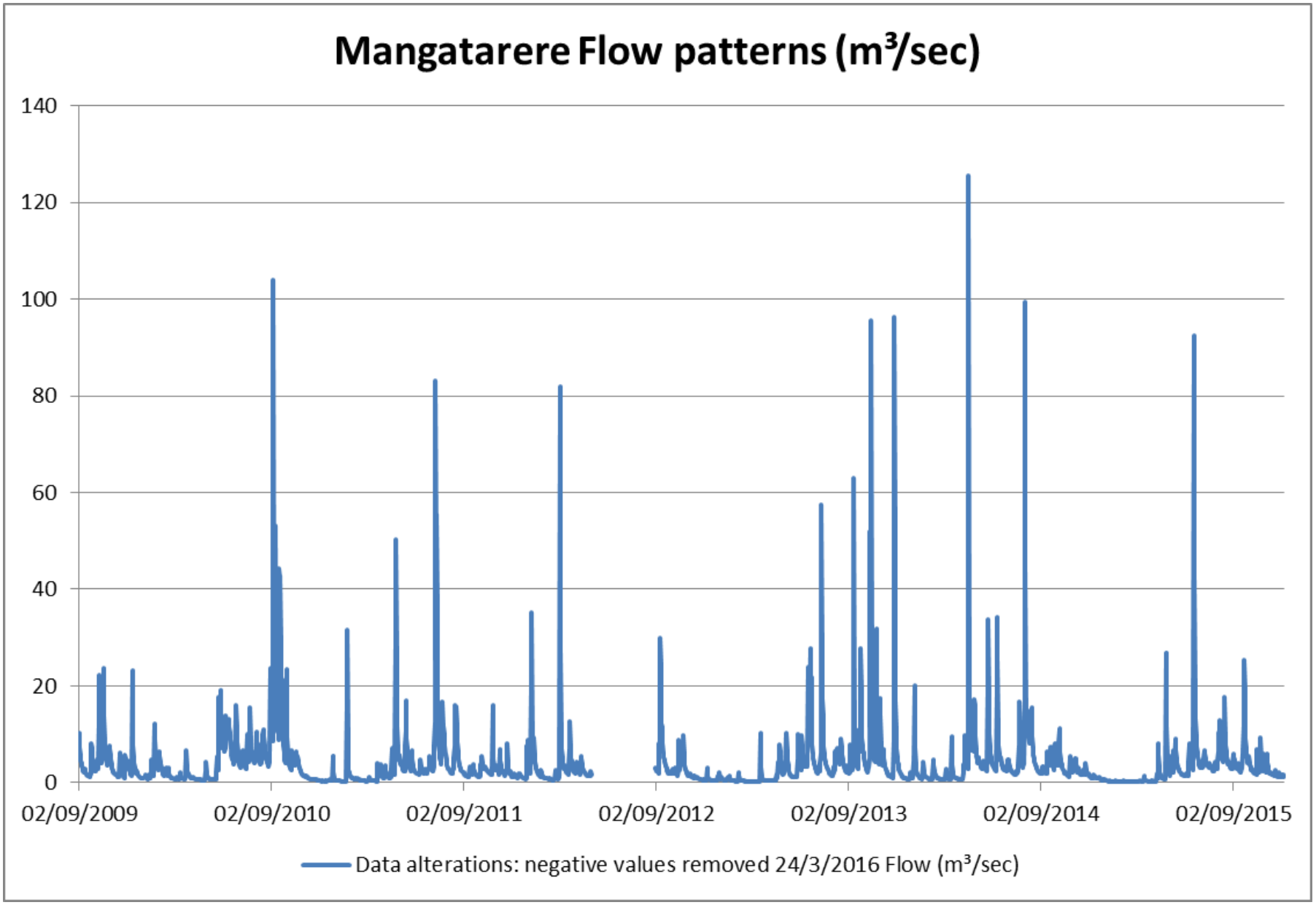


Water races


Carterton District
Hood Aerodrome
Carterton
Greytown
Featherston
2

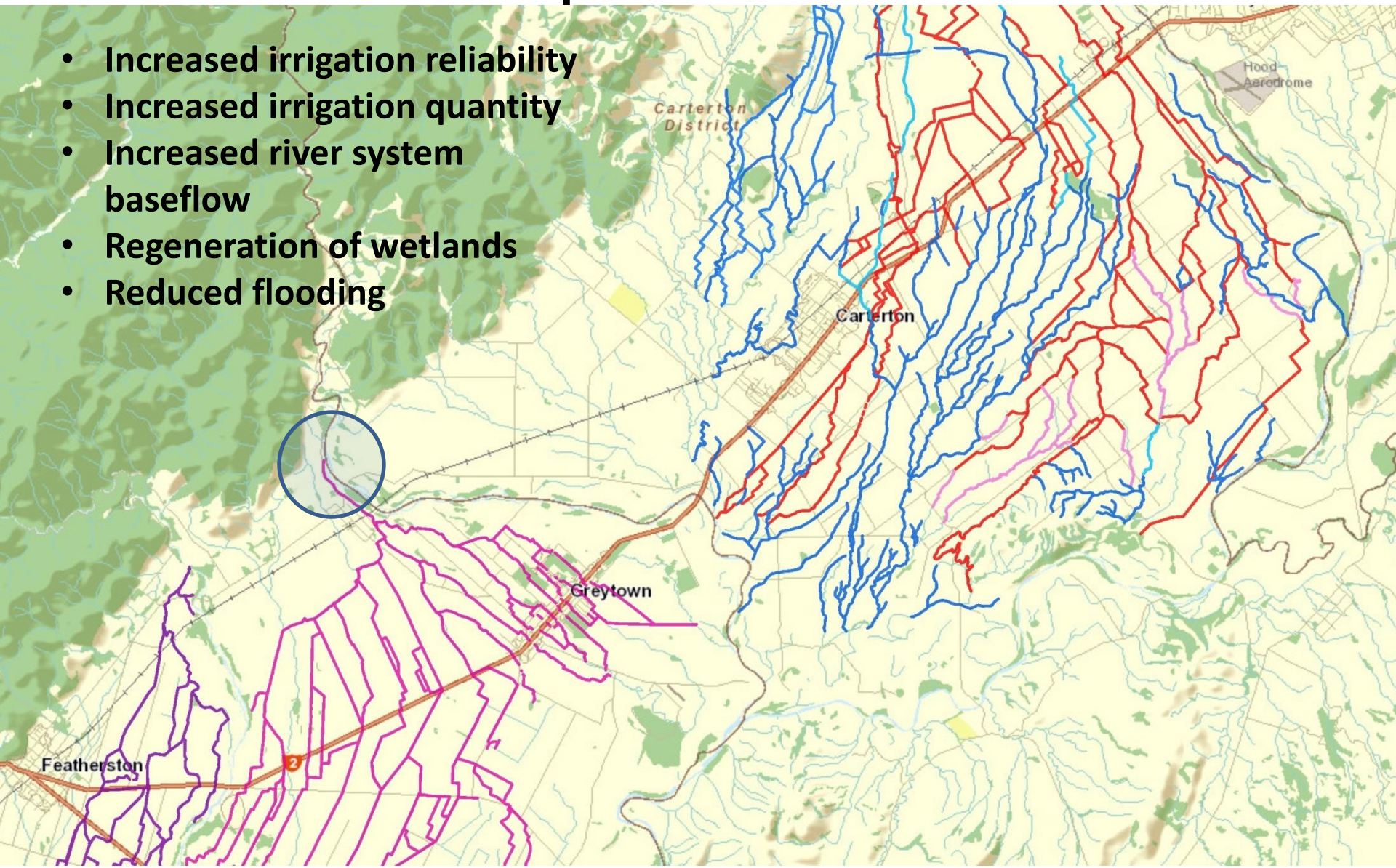
Waiohine FMP




Mangatarere Flow patterns (m³/sec)
140
120
100
80
60
40
20
0
02/09/2009
02/09/2010
02/09/2011
02/09/2012
02/09/2013
02/09/2014
02/09/2015
Data alterations: negative values removed 24/3/2016 Flow (m³/sec)

Multiple outcomes

- **Increased irrigation reliability**
- **Increased irrigation quantity**
- **Increased river system baseflow**
- **Regeneration of wetlands**
- **Reduced flooding**



Water Value options?

- A managed water scheme means that water could be charged for
- This would cover the costs of constructing and operating the scheme and
- Improve efficiency of use
- A rating system could also include contributions from flood management and general rates
- + charges in drought or –ve charges in flood?