

Kingston Confined Aquifer Groundwater Modelling

Kingston confined aquifer

The confined aquifer is a special and unique part of the natural heritage of the South East NRM Region. Its ancient origins and good quality make the confined aquifer an important and precious resource for future generations.

The Lower Limestone Coast Water Allocation Plan (WAP) recognises the importance of the confined aquifer in the Kingston Confined aquifer Management Area and highlights the need to understand the impact of extraction scenarios.

Confined aquifer water – a non-renewable resource

Recharge to the confined aquifer is believed to occur in Western Victoria and through downward leakage from the unconfined aquifer in locations where the pressure level in the confined aquifer is lower than that of the unconfined aquifer.

Recharge is generally to the east of a line called the 'zero head difference'. The 'zero head difference' is represented by the red line on the map below. The artesian nature of the confined aquifer west of the red line is recognised as an important economic factor for irrigators in the Kingston Confined Aquifer Management Zone.

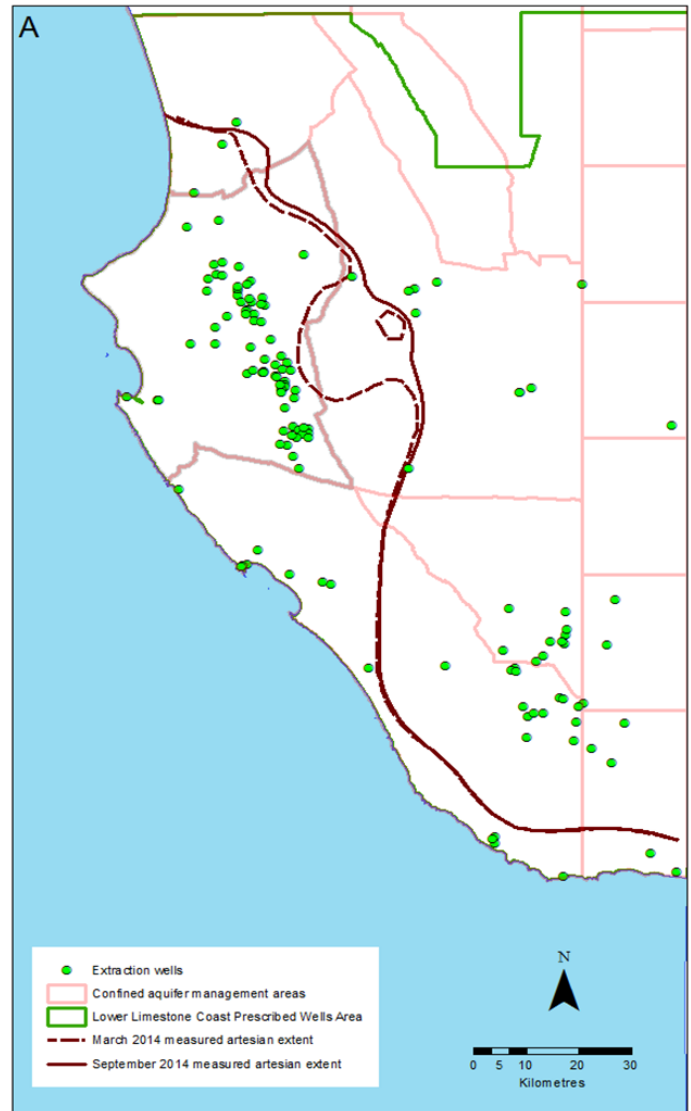
The Study

A study was commissioned by the South East Natural Resources Management Board to test three future water use scenarios and the potential impact of this extraction on the confined aquifer over a period of 50 years. The water use scenarios tested are:

- 1) Extraction of 15,000ML/yr (*the range of actual groundwater extraction is between 9000-15000 ML/yr*)
- 2) Extraction of 25,000ML/yr (*the permissible annual volume prior to volumetric conversion*)
- 3) Extraction of 40,000ML/yr (*the volume of water allocated after volumetric conversion*).

The study examined the impact of the taking of water on:

- Groundwater trigger levels (a decline of more than 0.1m/yr over 5 years)
- Artesian pressure
- Potential salinity impacts

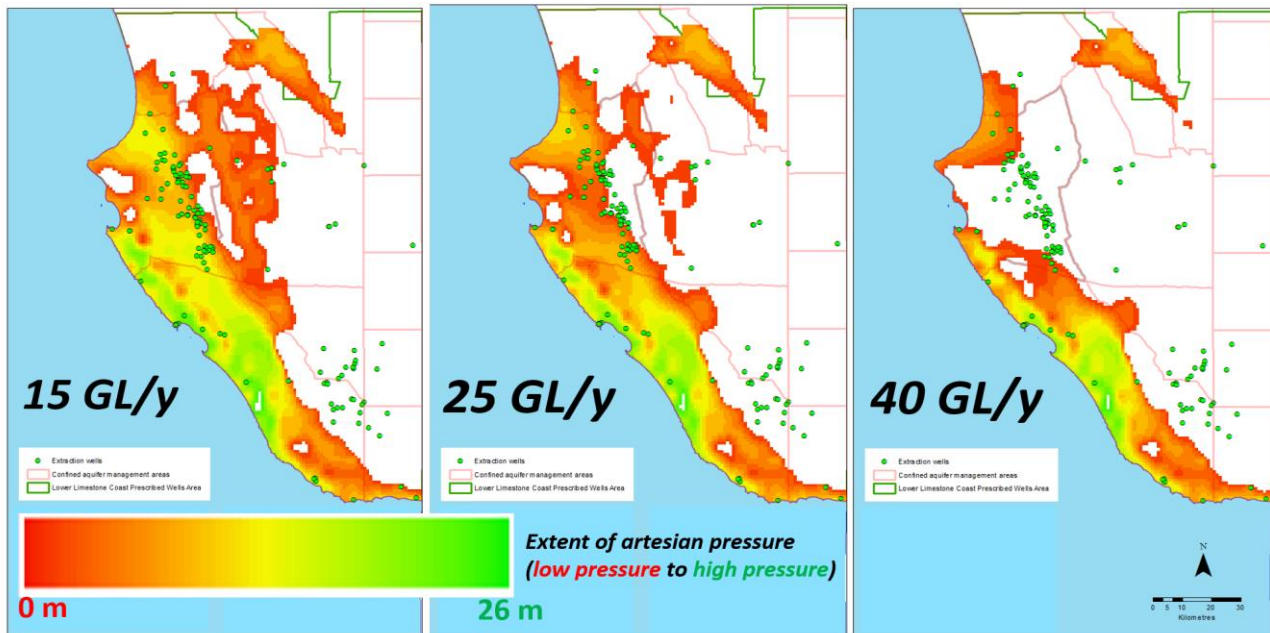


The study generated information that assists in determining a new sustainable level of allocation for the Kingston confined aquifer. Prior to volumetric conversion, the Permissible Annual Volume was assessed to be 25,000 ML/annum. Volumetric conversion resulted in area based allocations converted to a volumetric allocation of 40,000ML. The sustainable level of extraction in the WAP is currently set at 40,000ML.



Study Results

The shaded areas on the maps show the modelled impact over a 50 year period on the area within which artesian water flows freely to the surface. The modelling results show that the higher the level of extraction the greater the impact is on the availability of artesian water.



Scenario 1. 15 GL (15,000ML /yr)

Results

- Some seasonal drawdown occurs
- Triggers for decline in artesian pressure set off in short term, but then stabilise
- Artesian pressure is generally maintained

Scenario 2. 25GL (25,000ML /yr)

Results

- Larger seasonal drawdown
- Trigger levels set off in short term, but then decline stabilises
- Extent of artesian pressure at the end of the irrigation starts to contract – in the Kingston management area previously flowing bores would likely need to be pumped
- Salinity – potential increase in confined aquifer salinity through downward leakage of unconfined aquifer water

Scenario 3, 40 GL (40,000ML /yr)

Results

- Extensive seasonal drawdown
- Trigger levels set off in short term (by a factor of 10), but then the decline stabilises
- Loss of artesian pressure during irrigation season
- Likely loss of flowing bores during irrigation season – water licensees would need to start pumping from the confined aquifer
- Salinity- potential increase in confined aquifer salinity through downward leakage of unconfined aquifer water

Next Steps

All Kingston confined aquifer allocation holders need to have a say in the sustainable level of allocation in the Kingston Confined aquifer.

In 2016/17 Natural Resources South East will work with allocation holders, discuss the outcome of the groundwater study and define an agreed sustainable level of allocation for the future of the Confined aquifer

For more information or to access of copy of the SE Confined aquifer modelling investigations project visit either: www.naturalresources.sa.gov.au/southeast or www.waterconnect.sa.gov.au or contact Natural Resources South East 87351177 to obtain a copy



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