

Musgrave PWA

Bramfield lens

2014 Groundwater level and salinity status report



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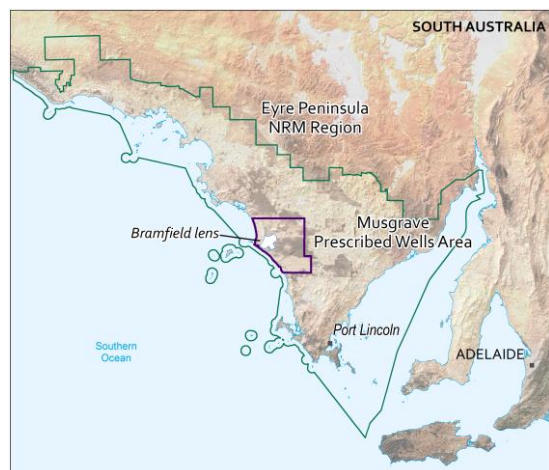
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2014 Summary



The Musgrave Prescribed Wells Area (PWA) is situated in central Eyre Peninsula, approximately 120 km north-west of Port Lincoln in the Eyre Peninsula NRM Region. It is prescribed under South Australia's *Natural Resources Management Act 2004* and a water allocation plan provides for the sustainable use of the groundwater resources. The Bramfield lens is situated in the west of the Musgrave PWA.

Within the Musgrave PWA there are three main sedimentary sequences containing groundwater that overlie basement rocks: the Quaternary limestone aquifer, the underlying Tertiary sands aquifer, and deeper Jurassic sediments within the Poldo Trough. The Quaternary limestone aquifer comprises a generally thin veneer of aeolianite sediments of the Bridgewater Formation and is continuous across the PWA. Areas within the Quaternary limestone aquifer defined by salinity of less than 1000 mg/L, such as the

Bramfield lens, are described as fresh groundwater lenses in the current water allocation plan. The main source of recharge to the Quaternary limestone aquifer is the direct infiltration of rainfall and groundwater flow is predominantly in a westerly to south-westerly direction towards the Southern Ocean.

The condition of the groundwater resources in the Musgrave PWA is highly dependent on recharge from rainfall, with trends in groundwater levels and salinity primarily climate driven: below-average rainfall results in a reduction in recharge to the aquifers. Below-average summer rainfall can also result in increasing irrigation extractions, and these two elements can cause the groundwater levels to fall and salinity to increase. Conversely, increases in rainfall results in increases in recharge, decreases in irrigation extractions and groundwater levels may rise and salinity stabilise or decline. Historical rainfall data have indicated that trends of above or below-average rainfall can last for up to 25 years, and that greater recharge responses have been observed when rainfall occurs in high-intensity events.

The Elliston rainfall station (number 18069), located to the south-west of the Bramfield lens in the township of Elliston, recorded 396 mm of rain in 2014. This is 34 mm below the long-term average of 430 mm for this station. In 2014, monthly rainfall totals were significantly above average in February and above average between May and July due to high-intensity events; however, considerably below-average rainfall was recorded between August and December (Fig. 1).

Licensed groundwater extractions occur predominantly from the fresh groundwater lenses within the Quaternary limestone aquifer, and the Bramfield lens has provided groundwater for the town water supply of Elliston since 1974. Metered extractions from the Bramfield lens in the 2013–14 water-use year totalled 71 ML, a 6% increase from the previous water-use year¹ (Fig. 2). This volume of extraction equates to 7.5% of the total allocation limit of 1201 ML for the Bramfield lens and accounts for 99% of the total licensed extractions within the Musgrave PWA.

Observation wells monitoring the Bramfield lens show a steady decline in groundwater levels of 2–3 m corresponding to an extended period of below-average rainfall between the 1980s–2008. Above-average rainfall in 2009 and 2010 resulted in a significant rise in water levels, particularly in the south of the lens. Water levels have fluctuated since 2010 in response to seasonal rainfall.

In 2014, the above-average rainfall in the first half of the year led to groundwater level rises of 0.07–0.72 m, with a median increase of 0.14 m, in four of the six observation wells located in the north-east of the Bramfield lens area. Groundwater level declines of 0.03 and 0.48 m were observed in two wells in the south of the lens. Overall, there was a median 0.09 m rise in groundwater levels across the lens.

Observation wells show variation in salinity trends over the historical record, with increasing salinity during the below-average rainfall years between 2006 to 2008. Significant freshening occurred after June 2009 as a result of increased recharge from above-average rainfall between 2009 to 2011.

¹ Actual extraction during the previous water-use year may have been higher as extraction data for the one of the three licensed users was not collected in 2012–13.

Salinities of between 425 and 1110 mg/L were recorded in 2014, however, not all observation wells were sampled during the year (Fig. 4). The five wells for which salinity was measured in both 2013 and 2014 show a median 7% decrease in salinity, possibly as a result of the high-intensity recharge events in 2014.

The Bramfield lens of the Musgrave PWA has been assigned a green status for 2014:

2014 Status



“No adverse changes, indicating negligible risk to the resource”

This means that the groundwater status was observed to be stable (i.e. negligible change) or improving over the 12-month reporting period. If these conditions were to continue, there is a very low likelihood of negative impacts on beneficial uses such as drinking water, irrigation or stock watering.

The 2014 status for the Bramfield lens is supported by:

- an overall increase in the maximum recovered groundwater level in 2014 when compared with 2013 water level data
- an overall decrease in groundwater salinity in 2014 when compared with 2013 salinity data.

To view descriptions for all status symbols, please visit the *Water Resource Assessments* page on [WaterConnect](#).

To view the *Musgrave PWA Groundwater Level and Salinity Status Report 2011*, which includes background information on hydrogeology, rainfall and relevant groundwater-dependent ecosystems, please visit the *Water Resource Assessments* page on [WaterConnect](#).

To view or download groundwater level and salinity data from observation wells within the Musgrave PWA, please visit [Groundwater Data](#) on WaterConnect.

For further details about the Bramfield lens, please see the *Water Allocation Plan for the Musgrave Prescribed Wells Area* on the Natural Resources Eyre Peninsula [website](#).

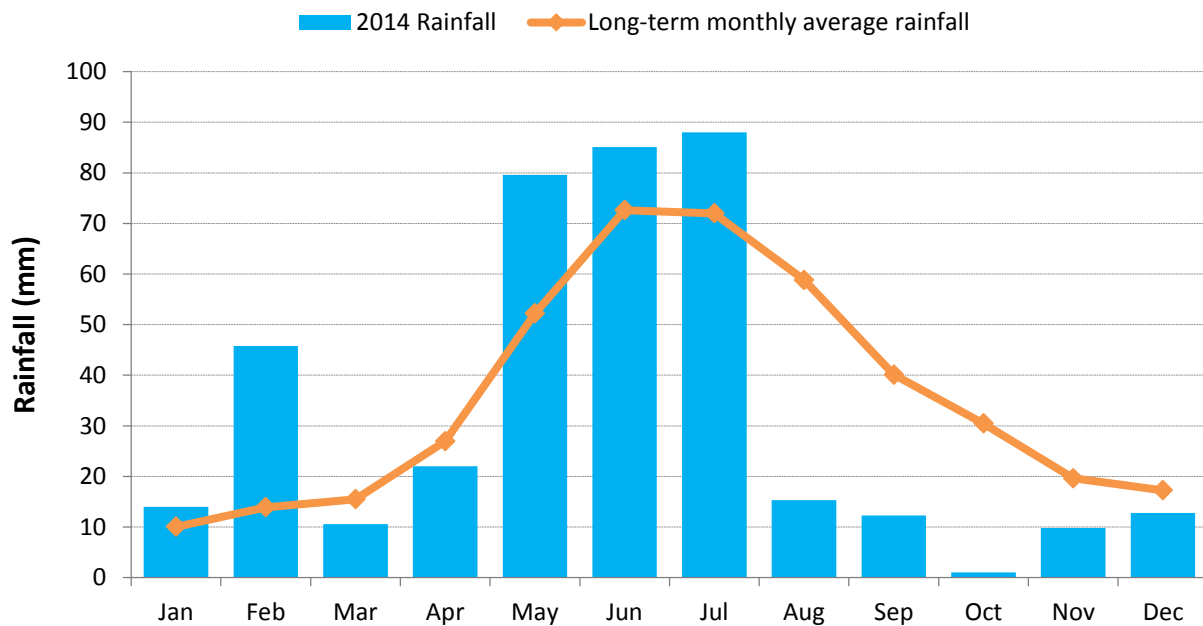


Figure 1. Monthly rainfall (mm) for 2014 and the long-term average monthly rainfall (mm) at the Elliston rainfall station² (number 18069) in the Musgrave Prescribed Wells Area

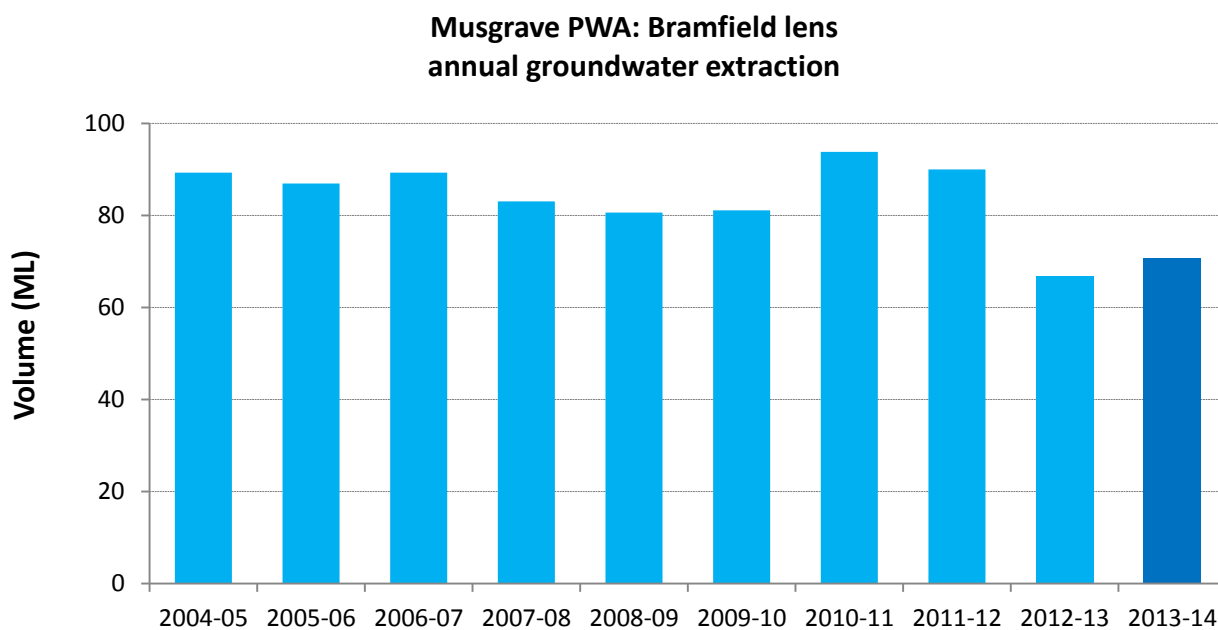


Figure 2. Historical licensed groundwater use for the Bramfield lens of the Musgrave Prescribed Wells Area

² Rainfall data used in this report is sourced from the SILO Patched Point Dataset, which uses original Bureau of Meteorology daily rainfall measurements and is available online at www.longpaddock.qld.gov.au/silo.

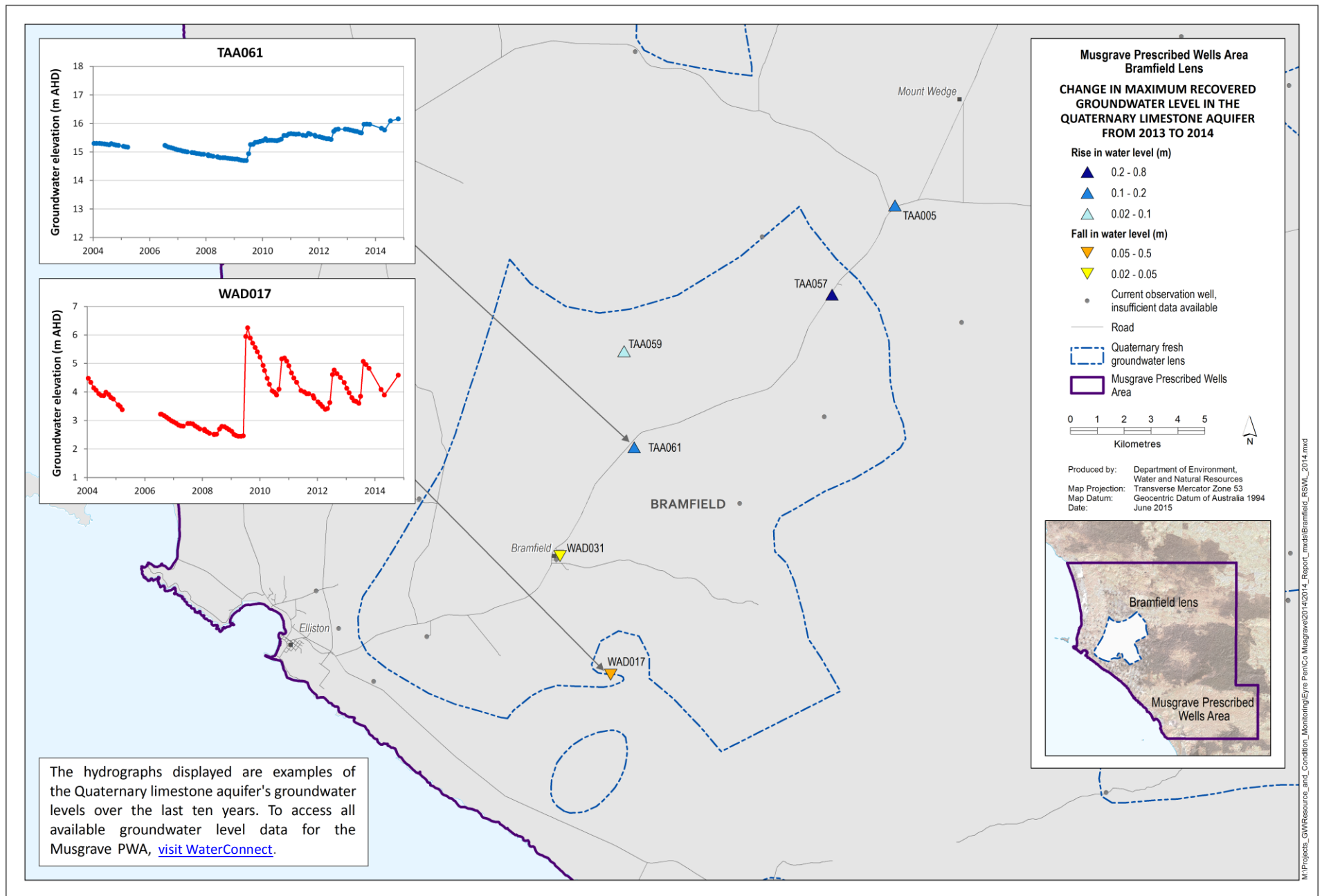


Figure 3. Overall changes in maximum recovered groundwater levels in the Bramfield lens of the Musgrave Prescribed Wells Area from 2013 to 2014

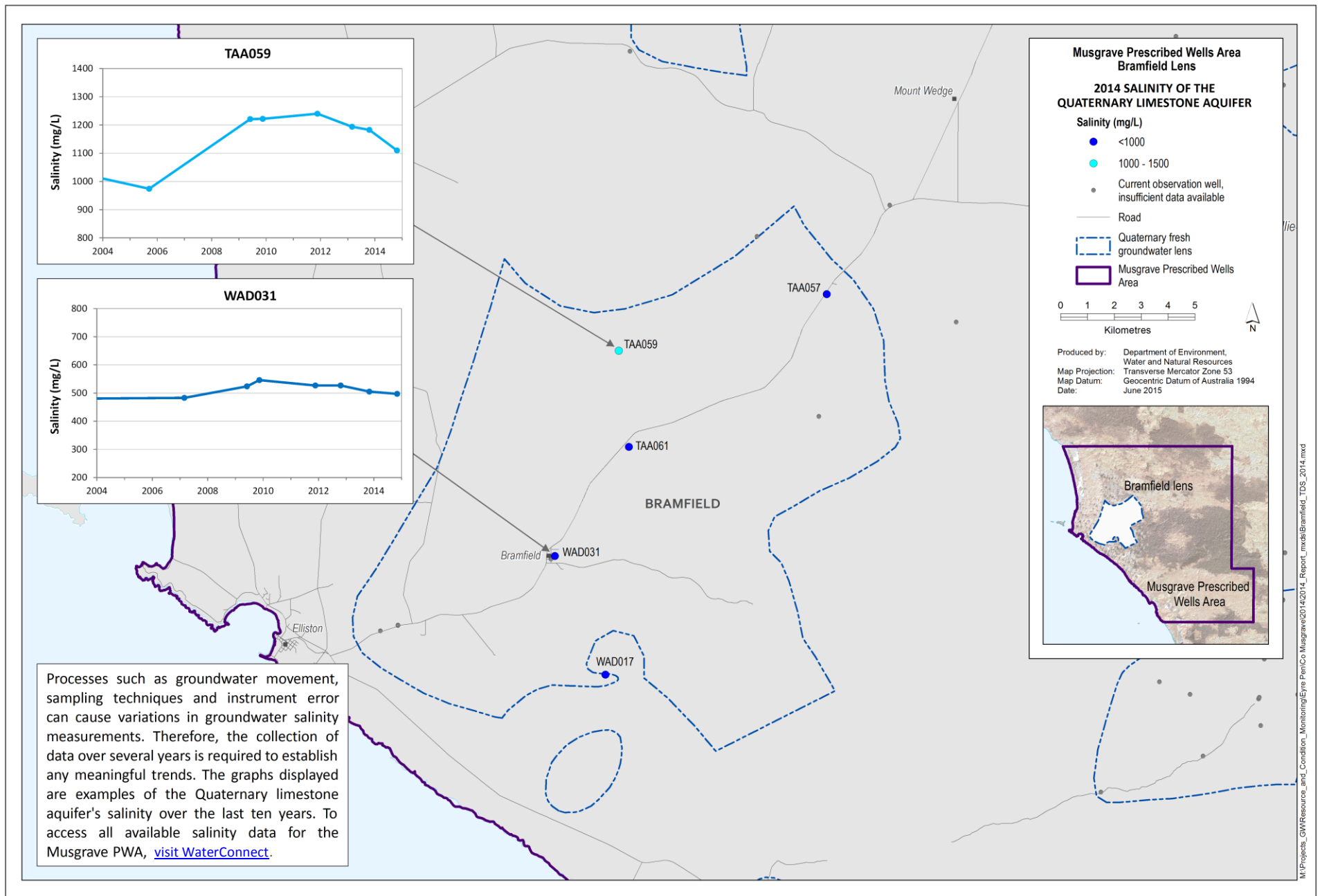


Figure 4. Groundwater salinity of the Bramfield lens in the Musgrave Prescribed Wells Area in 2014