

# Bramfield

Eyre Peninsula Groundwater Dependent Ecosystems monitoring site

## 2020 Report Card

### Summary

**Type of site:** Licensed extraction monitoring site.

**Status:** **Green**, improving trends in the short term (2016 to 2020).  
Improvement in condition (2020) likely due to early and regular rainfall.

**Red Gums:**



Condition  
**Good**



Trend  
**Improving**  
Short term  
(2016 to 2020)



Trend  
**More data required**  
Long term

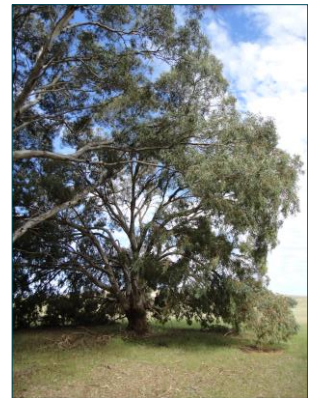
**Ground water levels:**



Trend  
**Declining**  
Short term  
(2016 to 2020)

**Climate:** Above average maximum temperatures and decline in winter rainfall and recharge events.

This Report Card should be read in conjunction with the Overview, which provides information about Groundwater Dependent Ecosystem (GDE) monitoring and summary information for all monitored GDE sites.

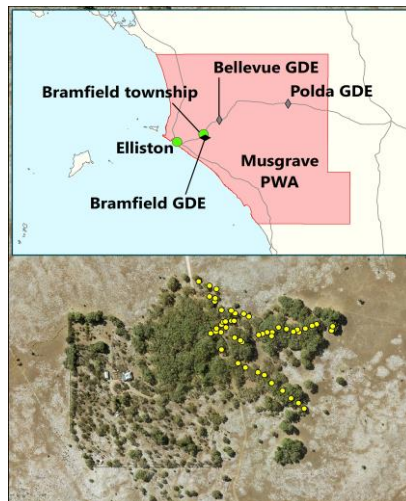


Adult Red Gum at Bramfield assessed as 'very good' condition in Oct 2020.

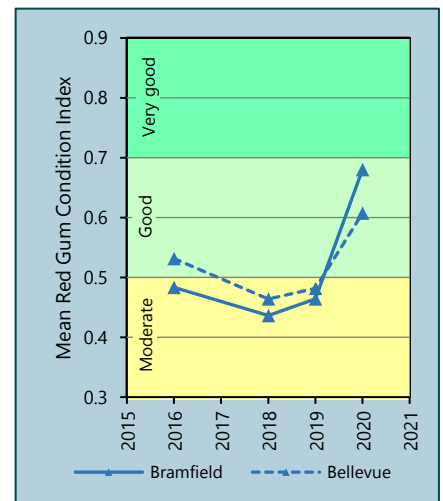
The **Bramfield** Groundwater Dependent Ecosystem (GDE) monitoring site is situated one kilometre south of Bramfield. The site includes a remnant patch (approximately 16 ha) of Red Gum (*Eucalyptus camaldulensis*) Woodland. The understory is dominated by native and introduced grasses.

The Bramfield GDE site is monitored to assess the impacts of licensed water extraction from the Bramfield groundwater lens in the Musgrave Prescribed Wells Area. There are a number of users (including SA Water) who hold licenses to extract water for town water supply, domestic use, and other private commercial purposes. Water extraction information can be [found on WaterConnect](#) in the *Musgrave Prescribed Wells Area 2018-19 groundwater status overview*.

There is also extraction of water for stock and domestic purposes for which a license is not necessary. This extraction is assumed to be low compared to extraction for licensed consumptive purposes, and there is a low likelihood of it having any impact on the GDE.



Bramfield site map  
(yellow dots represent 50 surveyed trees)



**Graph 1** Change in Red Gum Condition Index at Bramfield and Bellevue (control site for Bramfield) from 2016 to 2020

### Red Gum condition

Tree condition monitoring is carried out in late October to early November. First completed in 2016, monitoring has been repeated annually since 2018. In 2016 the average Red Gum Condition Index (RCI) score was 0.48. There was some decline in condition in 2018 and 2019, but condition improved in 2020, (average RCI score of 0.68). This shows a 20% improvement in Red Gum condition since 2016. The dataset is, however, too short to enable determination of any long term trends. The higher RCI measured in 2020 can be attributed to high levels of reproduction (flower and fruit) and tip growth observed in the trees.

## Groundwater and climate assessment

Although an improvement in Red Gum condition was evident in 2020, groundwater levels continued to decline (approx. 30 cm) at Bramfield (Graph 2).

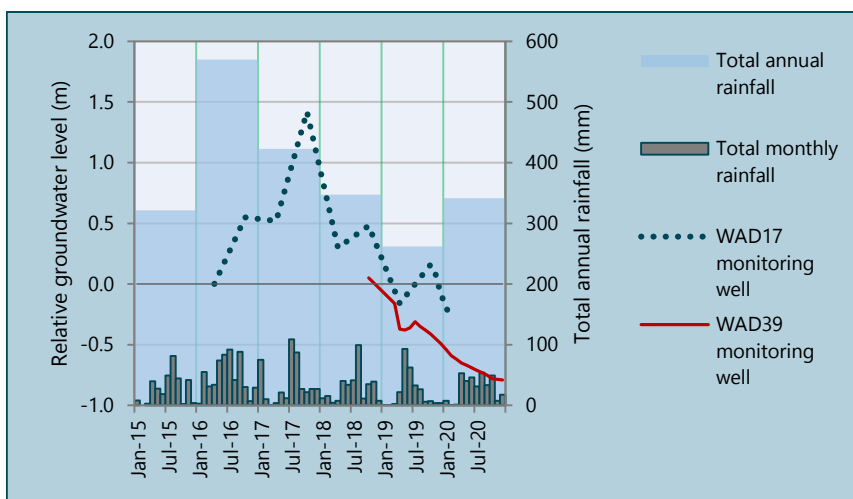
A similar decline in groundwater levels was observed at the control site Bellevue (also approx. 30 cm), which is located outside the zone of influence of licensed extraction. Since declines in groundwater occurred at both the control and the licensed extraction sites, this indicates the decline can be attributed to factors other than licensed extraction, specifically reduced recharge, and increasing temperature.

As detailed below, graphs on the right show climatic factors possibly contributing to groundwater decline, but also improvement in Red Gum condition:

- Total annual rainfall increased from 262 mm in 2019 to 342 mm in 2020 (Graph 2), but remained 70 mm below the long term<sup>1</sup> mean annual rainfall.
- In 2020 there was no month with high total rainfall (Graph 2), as can generally be seen in the long term record<sup>1</sup>. In addition, the maximum daily rainfall was 21% less than the long term<sup>1</sup> mean. The combination of these two factors, while not a direct measure of rainfall intensity and duration, are an indication that rainfall in 2020 was of lower than average intensity and duration.
- Temperatures remained hotter than usual, with the annual average of the daily maximum temperature 0.3°C above the long term<sup>1</sup> mean (Graph 3).

Rainfall intensity and duration, and not just volume, are important for groundwater recharge. Although total annual rainfall increased, it was probably of lower intensity and duration. This, combined with an increase in maximum temperatures, could result in water being available in the upper soil profile, but NOT infiltrating deeper to contribute to groundwater recharge. The increased water in the upper soil profile would be immediately available to the Red Gums, likely resulting in improved tree condition despite a decline in groundwater levels.

<sup>1</sup>All long term averages are for the period 1 Jan 1889 to 31 Dec 2020.

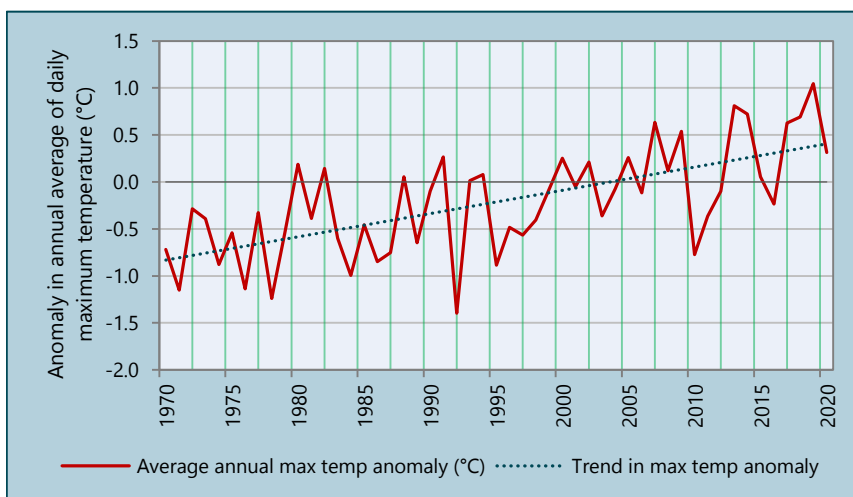


**Graph 2** Total annual and total monthly rainfall<sup>^^</sup>, and change in groundwater levels<sup>\*\*</sup> at two monitoring wells, WAD17 and WAD39

Notes:

<sup>^^</sup>Rainfall data for 2016 to 2018 is obtained from the Bureau of Meteorology station, Bramfield Post Office (number 18003). Rainfall data for 2019 and 2020 is site specific data obtained from the rainfall gauge installed at the Bramfield GDE site.

<sup>\*\*</sup>For each monitoring well (WAD17 and WAD39), the groundwater levels shown are relative to the groundwater level at the start of the monitoring period, which is shown as zero.



**Graph 3** Anomaly in annual average of daily maximum temperature<sup>^</sup> from 1970 to 2020

Note:

<sup>^</sup> This is the difference between the annual average of the daily maximum temperature for any one year and the long term<sup>1</sup> mean of the annual average of the daily maximum temperature. Maximum daily temperature is measured at the Bureau of Meteorology station, Bramfield Post Office (number 18003).

## Monitoring into the future

Tree condition monitoring will continue on a yearly basis. As time goes on, more data will allow for the identification of any long term trends in the GDE condition.

New monitoring infrastructure was installed at Bramfield in 2019 to improve the site specific accuracy of data collection. Additions include:

- an additional monitoring well;
- a water level data-logger at one well; and
- a rain gauge to measure rainfall intensity and amount.

## For more information

Access the full report on assessment of Red Gum condition in 2018 [here](#):

Muller K. L., N.J. Souter and Australian Water Technology (2019). *Eyre Peninsula Groundwater Dependent Ecosystem Data Analysis: Red Gum tree condition data (five sites)*. A report for Natural Resources Eyre Peninsula, Department for Environment and Water, Port Lincoln, South Australia.

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