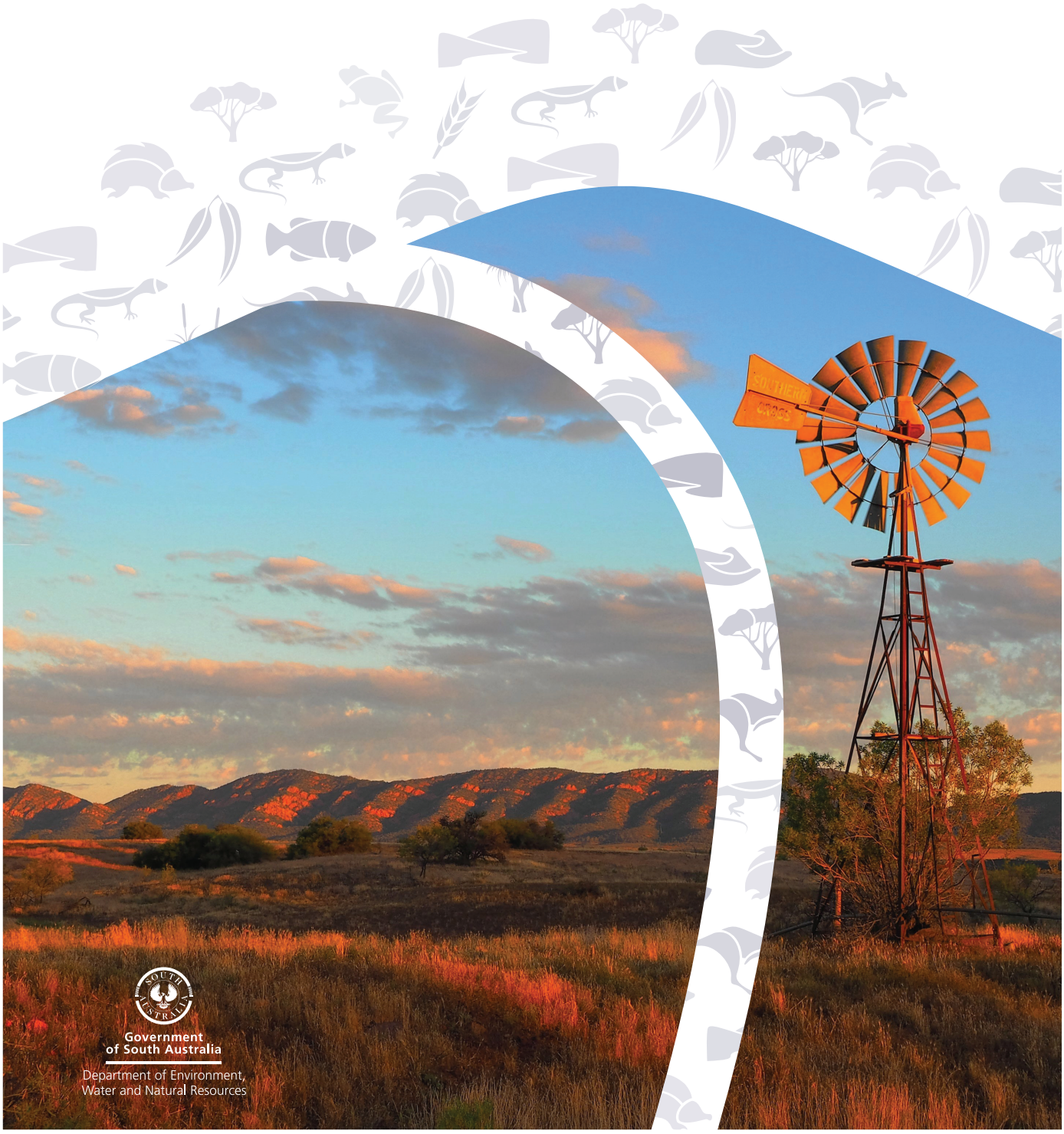
Angas Bremer PWA
Murray Group Limestone aquifer

2016 Groundwater level and salinity status report



Government of South Australia
Department of Environment, Water and Natural Resources

Department of Environment, Water and Natural Resources
GPO Box 1047, Adelaide SA 5001

Telephone	National	(08) 8463 6946
	International	+61 8 8463 6946
Fax	National	(08) 8463 6999
	International	+61 8 8463 6999
Website	www.environment.sa.gov.au	

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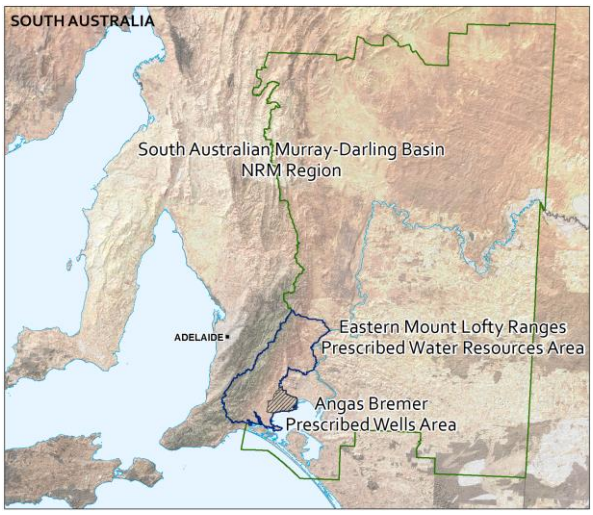
Regional setting



The Angas Bremer Prescribed Wells Area (PWA) is located on the western side of Lake Alexandrina, approximately 60 km south-east of Adelaide. It is located within the boundary of the Eastern Mount Lofty Ranges (EMLR) Prescribed Water Resources Area (PWRA), which lies within the South Australian Murray-Darling Basin Natural Resources Management Region. It is a regional-scale resource for which groundwater resources are prescribed under South Australia's *Natural Resources Management Act 2004* and a water allocation plan (WAP) provides for the sustainable management of the groundwater resources.

There are three aquifers underlying the Angas Bremer PWA, namely: the Quaternary aquifer; the confined Murray Group Limestone (MGL) aquifer; and the Renmark Group confined aquifer. All licensed groundwater extractions occur from the MGL aquifer, which is the focus of this report.

The MGL aquifer is up to 100 m thick and varies in composition from soft clayey limestone, hard sandy limestone to soft bryozoal limestone layers. The direction of groundwater flow is generally south-east towards Lake Alexandrina. Irrigation water is obtained mainly from the fossiliferous limestone member, which can be cavernous in some areas. Well yields vary from around 5 L/s in the north to over 15 L/s in the south, with yields up to 40 L/s in places.

Despite being a confined aquifer that does not receive direct recharge from rainfall, the intensity and timing of rainfall and subsequent extraction practices can have an effect on groundwater pressure levels and salinity in the MGL aquifer. For example, if the region experiences above-average rainfall during typically dry summer months, this could result in less groundwater being extracted, and consequently there may be smaller seasonal declines (or possibly rises) in groundwater pressure levels and salinity may stabilise or decline.

2016 Status

The Murray Group Limestone aquifer of the Angas Bremer PWA has been assigned a green status for 2016:

2016 Status  Positive trends have been observed over the past five years

The 2016 status of the Murray Group Limestone aquifer is based on:

- most monitoring wells (60%) show a five-year trend of rising or stable groundwater pressure levels
- most monitoring wells (97%) show a five-year trend of decreasing or stable salinities.

Rainfall

The Langhorne Creek rainfall station (BoM Station 24515) is located within the Angas Bremer PWA and recorded 303 mm of rainfall in the 2015–16 water-use year. This is 22% less than long-term average annual rainfall (1900 to 2016) of 387 mm and 20% less than the five-year average annual rainfall (2011–12 to 2015–16) of 378 mm (Figs 1 and 2). Monthly rainfall data show February, March, May and July were above average in comparison with respective long-term monthly average rainfall.

Water use

In 2015–16, licensed extractions totalled 2210[1] ML, which is 5% less than the previous water-use year of 2315 ML and 9% above the five-year average of 2033 ML (Fig. 2). This includes water that has been stored in the aquifer by irrigators over previous years via managed aquifer recharge (MAR). The total volume of MAR injection to the MGL aquifer in the 2015–16 water-use year was 1024[1] ML, which represents a 13% increase from 2014–15 but an 18% decrease when compared with the five-year average (Fig. 4).

Groundwater pressure levels

In the five years to 2016, from a total of 35 monitoring wells, 13 wells (37%) show a trend of rising groundwater pressure levels while eight wells (23%) show stable pressure levels (Fig. 5). Rises in pressure levels ranged between 0.03 and 0.33 m/y with a median of 0.07 m/y. The remaining 14 monitoring wells (40%) show a trend of declining groundwater pressure levels, with a median decline of 0.05 m/y.

Groundwater salinity

Increases in salinity in the MGL aquifer due to downward leakage from the overlying brackish to saline Quaternary aquifer have been identified as the main threat to the long-term sustainability of irrigation in the Angas Bremer PWA. However, short-term salinity monitoring (i.e. over the past five years) shows stable or decreasing salinities, probably due to aquifer freshening as a direct result of injection of low-salinity water (MAR).

In 2016, 71% of salinity monitoring wells recorded salinities greater than 1500 mg/L (Fig. 6), which is generally considered to be the salinity tolerance level for most crop types. However, these salinities are typical for the MGL aquifer in this region. In the five years to 2016, salinity has decreased in 16% of salinity monitoring wells, while 81% of these show stable salinities (Fig. 7).

Groundwater condition indicators

The WAP for the EMLR PWRA region defines resource condition indicators that apply to the MGL aquifer within the Angas Bremer PWA. These indicators are designed to give early warning of adverse trends in salinity that may impact on users of the resource. As stated in the WAP, the water resources to be monitored in the Angas Bremer PWA are the two zones where the groundwater salinity is 2500 mg/L or less (Zone A and Zone B), as identified in the *Angas Bremer PWA Groundwater Level and Salinity Status Report 2007*. If an increase in groundwater salinity of 1.5% or more per year for three consecutive years across at least 50% of monitoring wells occurs, then an investigation is triggered. As none of the wells within Zone A and Zone B have shown three consecutive years of salinity increases greater than 1.5%, the resource conditions indicators have not been exceeded.

[1] The licensed groundwater use and managed aquifer recharge volumes for the 2015–16 water-use year are based on the best data available as of March 2017 and may be subject to change, as some data are in the process of being verified.

More information

To determine the status of the MGL aquifer for 2016, the trends in groundwater pressure levels and salinities over the past five years (2012 to 2016, inclusive) were analysed, in contrast to the year-to-year assessments that have been used in past *Groundwater level and salinity status reports*. Please visit the Frequently Asked Questions on the *Water Resource Assessments* page on WaterConnect for more detail on the current method of evaluating the status of groundwater resources.

To view descriptions for all status symbols, please visit the *Water Resource Assessments* page on WaterConnect.

To view the *Angas Bremer PWA Groundwater Level and Salinity Status Report 2009–10*, 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 monitoring wells within the Angas Bremer PWA, please visit Groundwater Data on WaterConnect.

For further details about the Angas Bremer PWA, please see the *Water Allocation Plan for the Eastern Mount Lofty Ranges* on the Natural Resources South Australian Murray-Darling Basin website.

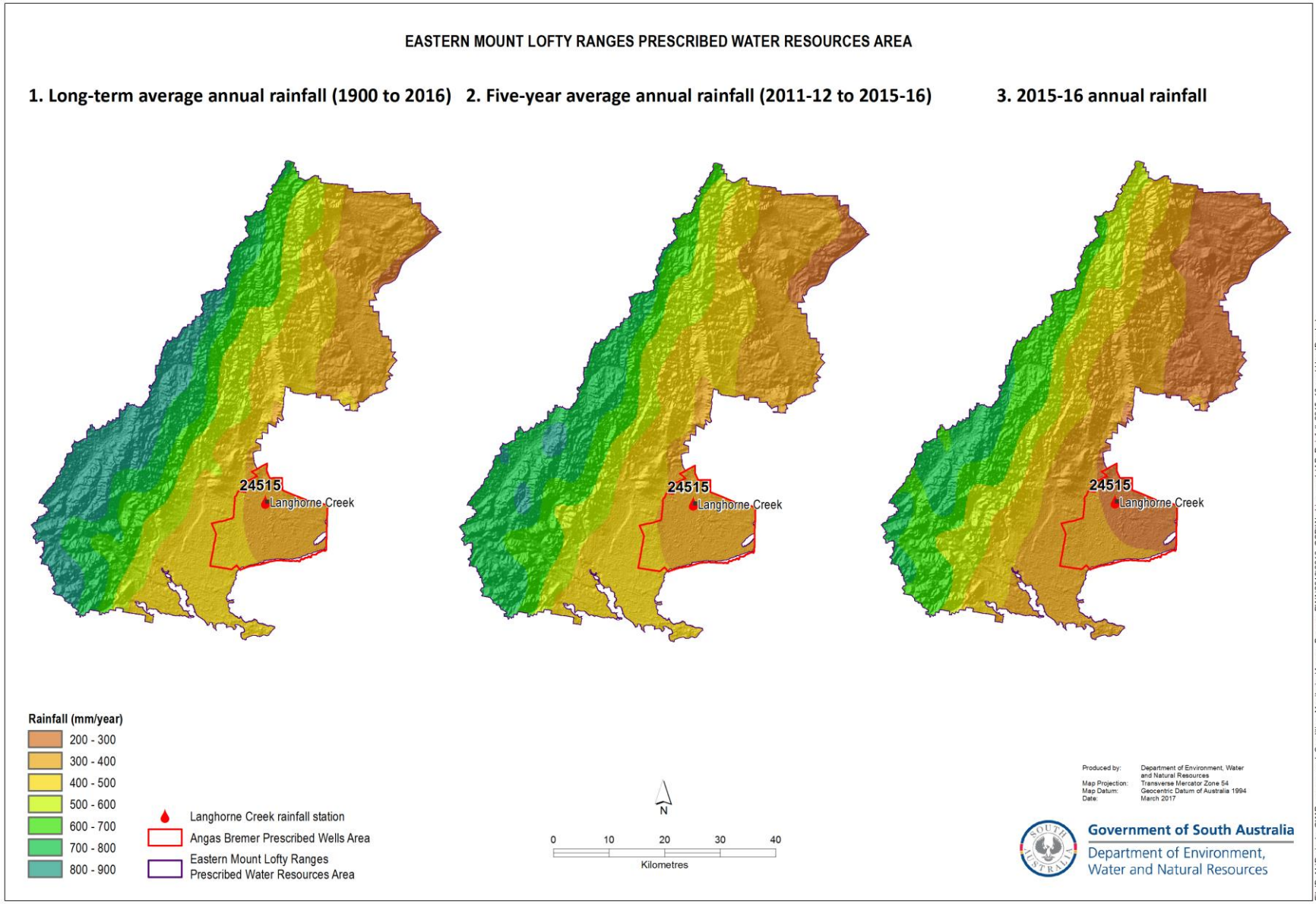


Figure 1. (1) Long-term and (2) five-year average annual rainfall, and (3) annual rainfall for the 2015–16 water-use year in Angas Bremer PWA[2]

[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.

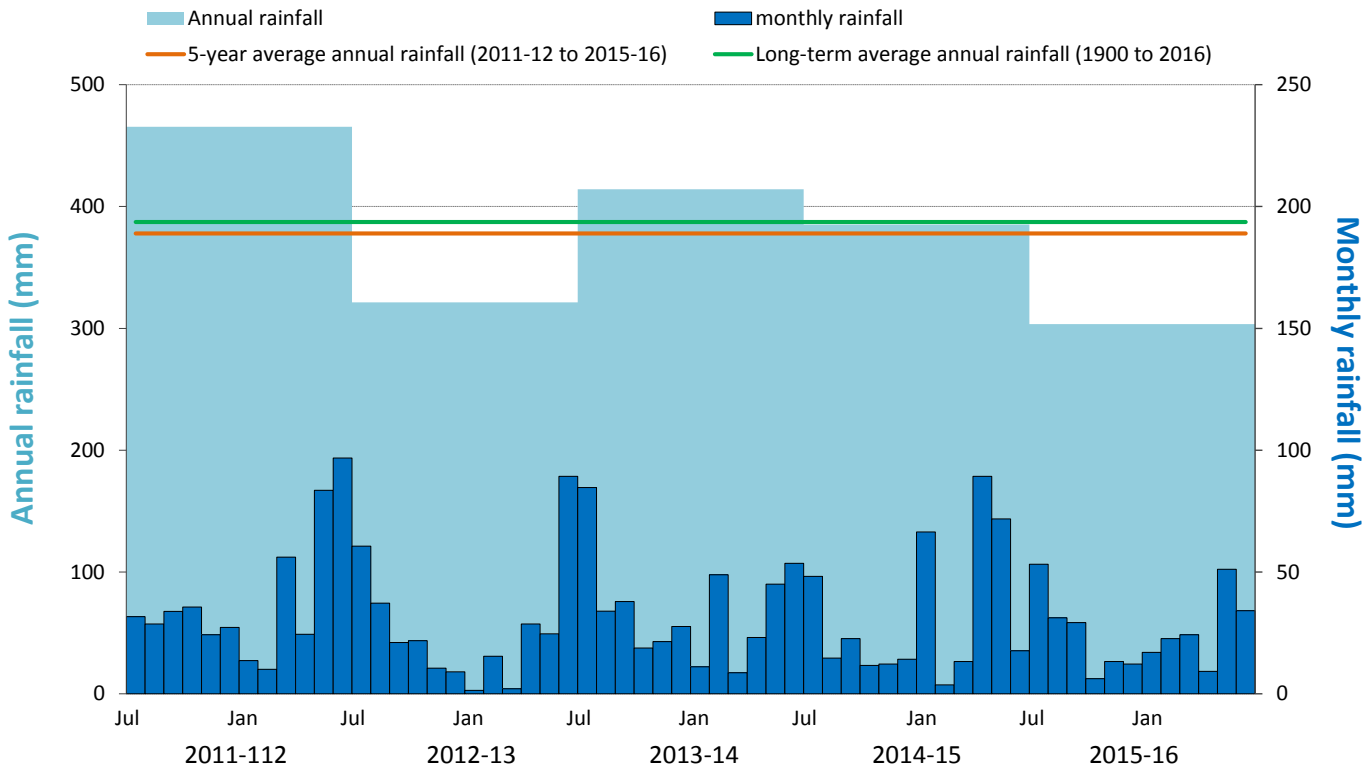


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Langhorne Creek (BoM Station 24515)[3]

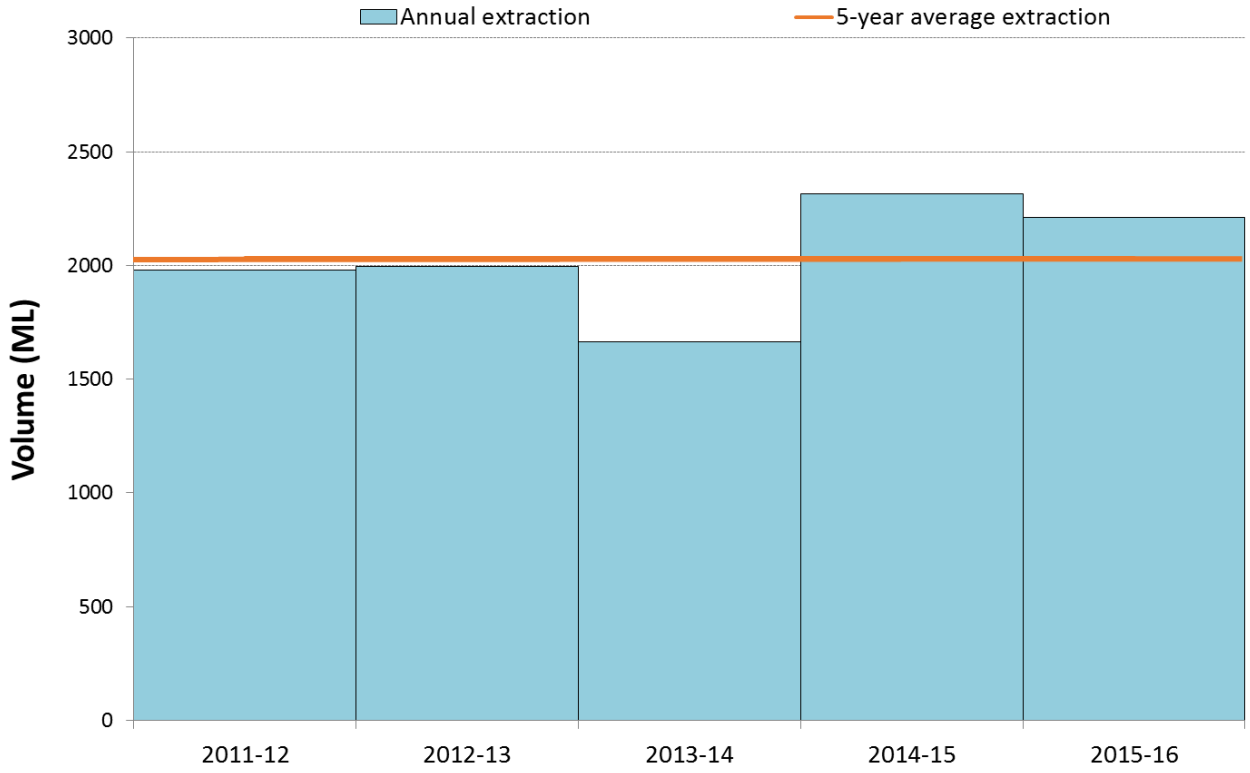


Figure 3. Licensed groundwater extraction volumes[4] for the past five water-use years, for the Murray Group Limestone aquifer in the Angas Bremer PWA

[3] 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.

[4] The licensed groundwater use and managed aquifer recharge volumes for the 2015–16 water-use year are based on the best data available as of March 2017 and may be subject to change, as some data are in the process of being verified.

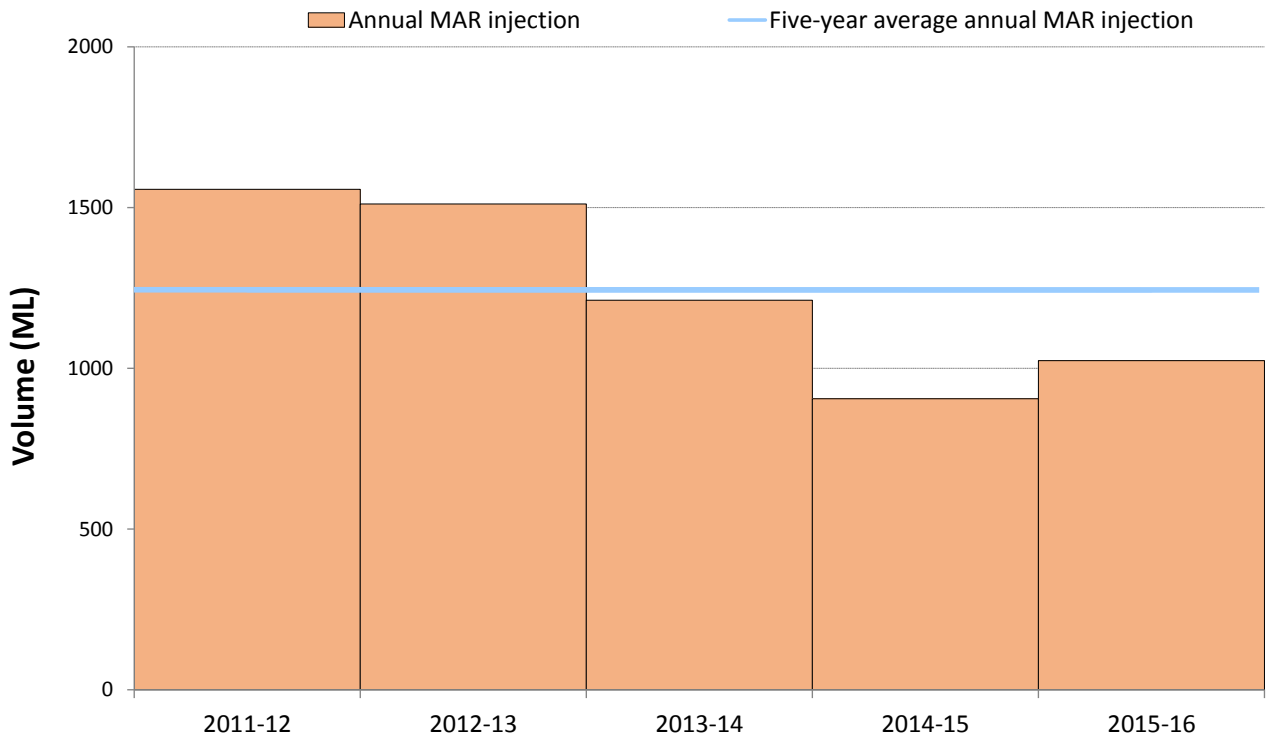


Figure 4. Managed aquifer recharge (MAR) injection volumes[5] for the past five water-use years, for the Murray Group Limestone aquifer in the Angas Bremer PWA

[5] The licensed groundwater use and managed aquifer recharge volumes for the 2015–16 water-use year are based on the best data available as of March 2017 and may be subject to change, as some data are in the process of being verified.

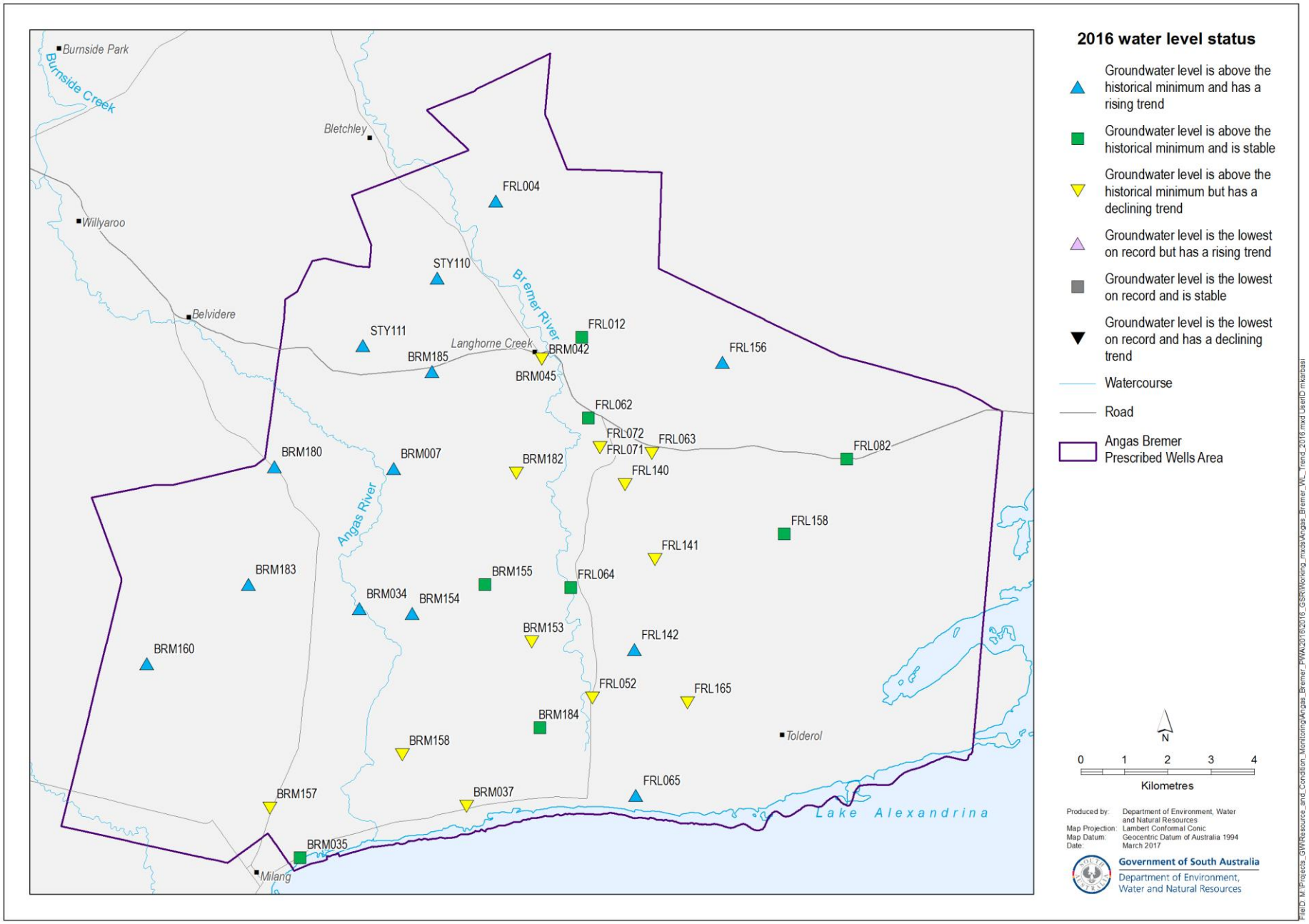


Figure 5. 2016 status of groundwater pressure levels in the Murray Group Limestone aquifer (Angas Bremer PWA) based on the 5-year trend from 2012 to 2016

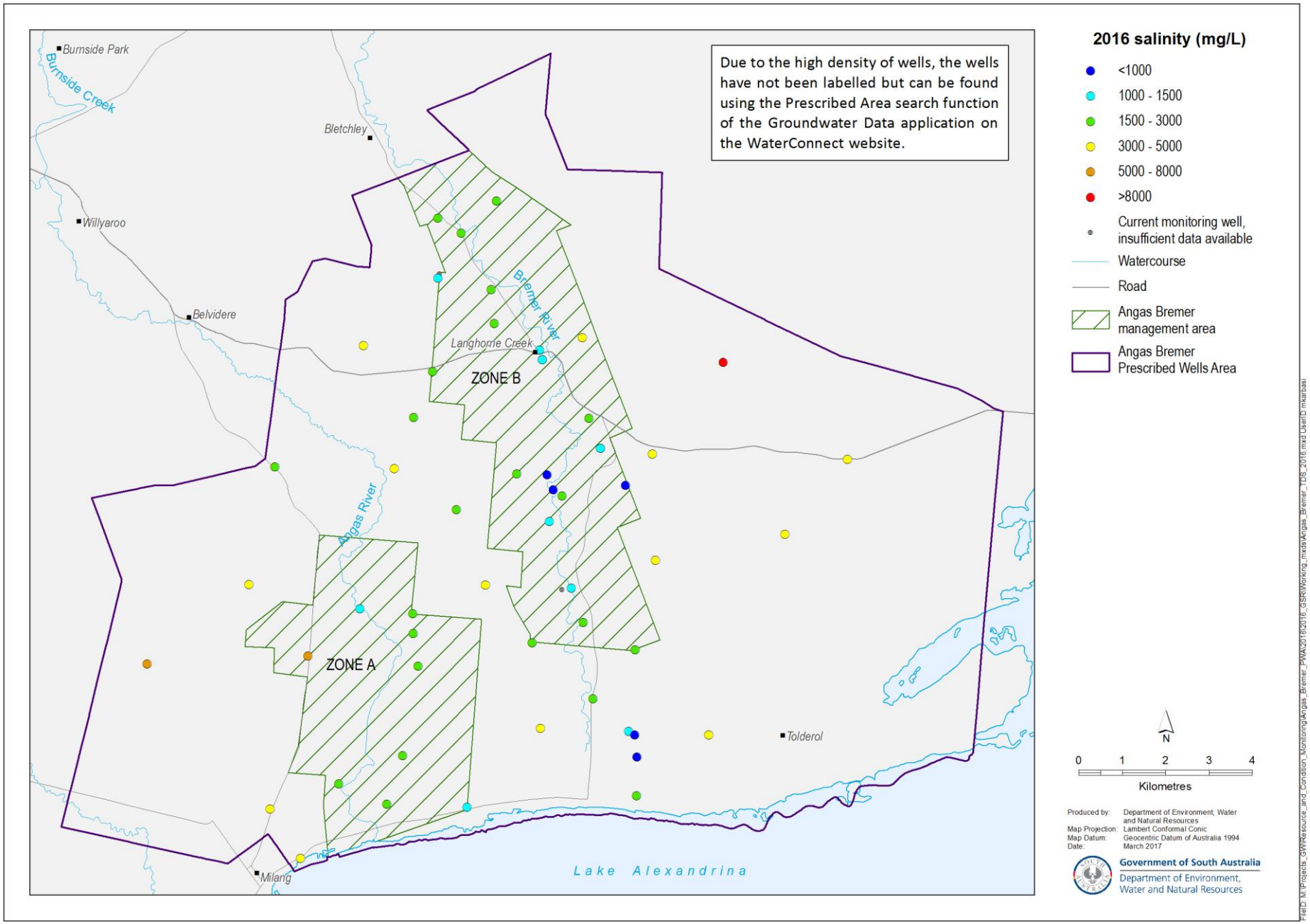


Figure 6. 2016 groundwater salinity of the Murray Group Limestone aquifer (Angas Bremer PWA)

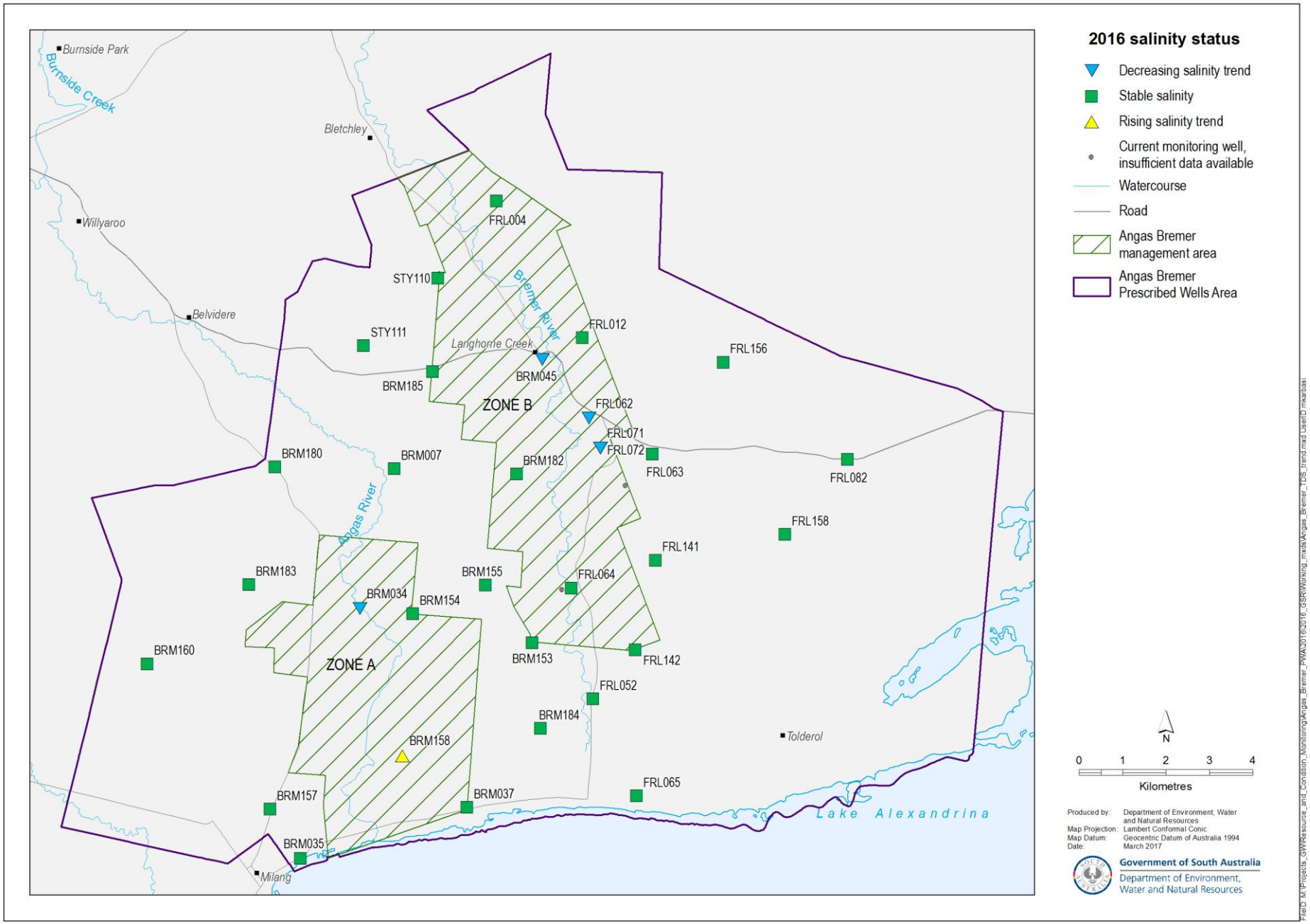


Figure 7. 2016 status of salinity in the Murray Group Limestone aquifer (Angas Bremer PWA) based on the 5-year trend from 2012 to 2016

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