Eastern Mount Lofty Ranges PWRA

Permian Sand aquifer

2015 Groundwater level and salinity status report

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

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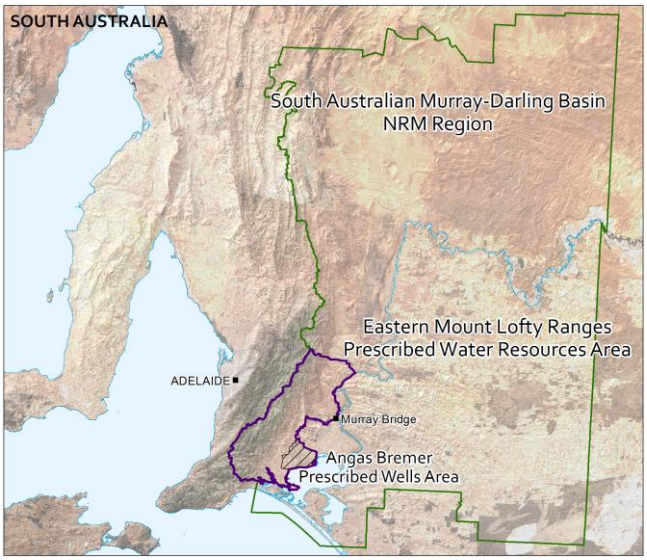
2015 Summary



The Eastern Mount Lofty Ranges Prescribed Water Resources Area (EMLR PWRA) is located about 50 km east of Adelaide. It lies within the South Australian Murray–Darling Basin NRM Region and covers an area of approximately 2845 km^2. It is a regional-scale resource for which groundwater is prescribed under South Australia's *Natural Resources Management Act 2004*. A water allocation plan (WAP) provides for the sustainable use of the water resources. The Angas Bremer Prescribed Wells Area (PWA) is located within the boundary of the EMLR PWRA and a separate groundwater level and salinity status report can be found on the Water Resource Assessments page of WaterConnect.

There are three main sedimentary groundwater systems in the EMLR PWRA: the Permian Sand, Murray Group Limestone (MGL) and Quaternary aquifers. This report focuses on the Permian Sand aquifer, which was deposited in several large U-shaped valleys that have been incised into basement rock (the Kanmantoo Group). Also known as the Cape Jervis Formation, it comprises glacial deposits of unconsolidated sands, silts and clays with occasional gravel beds. The Permian Sand aquifer forms part of the eastern slopes of the hills region and on the plains it underlies sediments of the Murray Basin. The Permian Sand aquifer is generally permeable, allowing high rates of rainfall recharge that results in high yields and low salinities. However, due to high clay content in some areas, the aquifer is instead low-yielding and higher in salinity. Despite this variability, the Permian Sand aquifer is widely developed for irrigation and town water supply.

Trends in groundwater level and salinity in the Permian Sand aquifer are primarily climate driven: below-average rainfall results in a reduction in recharge to the aquifer. Below-average summer rainfall can also result in increasing irrigation extractions, and these two elements can cause groundwater levels to fall and salinities to increase. Conversely, increases in rainfall results in increases in recharge, decreases in irrigation extractions and groundwater levels may rise and salinity stabilise or decrease.

The Ashbourne rainfall station (BoM Station 23701) was selected for data analyses due to its proximity to monitoring wells in the south of the PWRA (Fig. 1). In the 2014–15 water-use year, annual rainfall totalled 447 mm, 199 mm below the long-term annual average rainfall of 646 mm (1900–2015), and 166 mm below the five-year average annual rainfall of 613 mm (Figs. 1 and 2). Monthly rainfall generally follows seasonal variations typical of a Mediterranean climate, with higher rainfall during the winter months and lower rainfall during summer. A notable exception over the past five years is the wet summer of 2010–11. A trend of declining rainfall across the region over the past five years is evident (Figs. 1 and 2).

Groundwater extraction data are sparse across the EMLR PWRA. Estimated licensed extractions from all aquifers across the PWRA (excluding the Angas Bremer PWA) is 32 100 ML/y, based on a land-use survey and theoretical irrigation requirements for various crop types. This estimate of demand for groundwater is below the estimated sustainable yield of 38 757 ML/y, which has been calculated for the entire EMLR PWRA (excluding the Angas Bremer PWA). However, it is possible that demand may exceed the sustainable yield at the local scale (e.g. the Permian Sand aquifer within the Tookayerta Permian Management Zone).

In the Permian Sand aquifer, monitoring wells with long-term data show declines in groundwater levels have reached up to four metres, although most wells have recovered from the period of lower levels between 2003 and 2009.

Within the Tookayerta Permian Management Zone (Fig. 3), 14 of the 20 groundwater level monitoring wells recorded either stable levels or a rising trend over the past five years (Fig. 3). Rises ranged from 0.03 to 1.9 m/y with a median of 0.17 m/y. The remaining six wells show a five-year trend of declining groundwater levels and are mainly located in the Mount Compass area. Declines ranged between 0.02 and 0.2 m/y with a median of 0.7 m/y. Four wells recorded their lowest groundwater level on record in 2015, however, the largest overall decline in these wells totals 3.4 m over 15 years and the Permian Sand aquifer can reach more than 150 m in thickness.

Within the Finniss Permian 1 Management Zone (Fig. 3), all monitoring wells show groundwater levels above the historical minimum. Of these, 60% show stable levels or a rising trend over the past five years, while the remaining wells show a declining trend. Rises

in groundwater levels ranged between 0.02 and 0.27 m/y and declines were between 0.06 and 0.57 m/y. Most of the wells that show a declining trend are located near the township of Ashbourne.

Groundwater salinity of the Permian Sand aquifer has not been regularly measured in the past and as such, there is insufficient data available to conduct any trend analysis. However, the salinity of the Permian Sand aquifer typically measures less than 1000 mg/L. Annual salinity monitoring of groundwater sources by water licence holders in the EMLR PWRA is expected to improve this understanding in the future.

To determine the status of the Permian Sand aquifer for 2015, trends in groundwater level over the past five years (2011 to 2015, inclusive) were analysed. This is a new approach, 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.

Tookayerta Permian Management Zone

The Permian Sand aquifer in the Tookayerta Permian Management Zone of the Eastern Mount Lofty Ranges PWRA has been assigned a green status for 2015:

2015 Status  Positive trends have been observed over the past five years

The 2015 status of the Tookayerta Permian Management Zone is based on:

- most monitoring wells (70%) recording a five-year trend of rising or stable groundwater levels.

While the Tookayerta Permian Management Zone has been assigned a green status for 2015, there are localised instances of declining groundwater levels, particularly in the Mount Compass area.

Finniss Permian 1 Management Zone

The Permian Sand aquifer in the Finniss Permian 1 Management Zone of the Eastern Mount Lofty Ranges PWRA has been assigned a green status for 2015:

2015 Status  Positive trends have been observed over the past five years

The 2015 status of the Finniss Permian 1 Management Zone is based on:

- most monitoring wells (60%) recording a five-year trend of rising or stable groundwater levels.

While the Finniss Permian 1 Management Zone has been assigned a green status for 2015, there are localised instances of declining groundwater levels, particularly in the Ashbourne area.

To view descriptions for all status symbols, please visit WaterConnect.

To view the *Eastern Mount Lofty Ranges PWRA 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 Eastern Mount Lofty Ranges PWRA, please visit Groundwater Data on WaterConnect.

For further details about the Eastern Mount Lofty Ranges PWRA, please see the *Water Allocation Plan for the Eastern Mount Lofty Ranges* on the Natural Resources SA Murray-Darling Basin website.

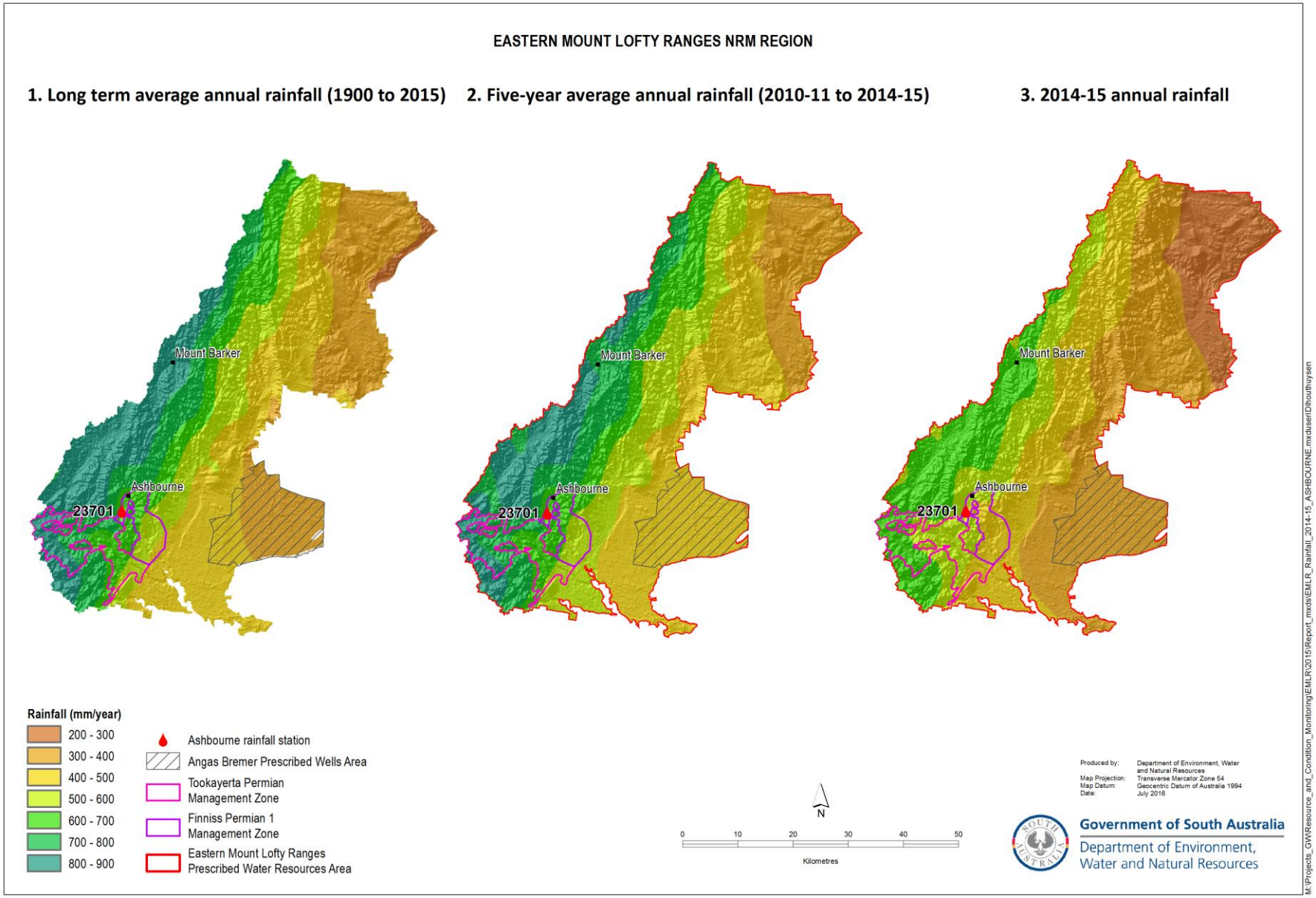


Figure 1. (1) Long-term and (2) five-year average annual rainfall and (3) annual rainfall for the 2014–15 water-use year in the EMLR Prescribed Water Resources Area[1]

[1] 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.

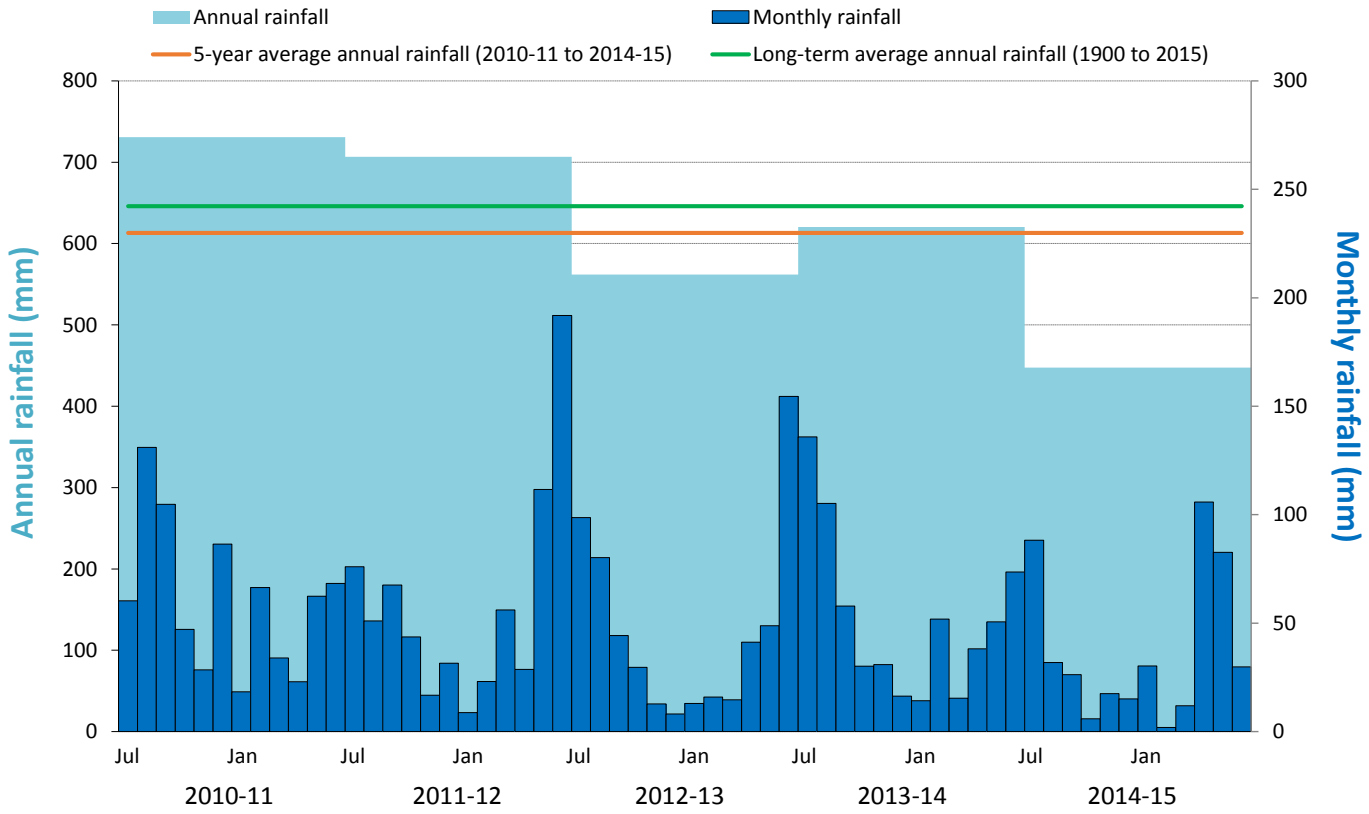


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Ashbourne (BoM Station 23701)[2]

[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.

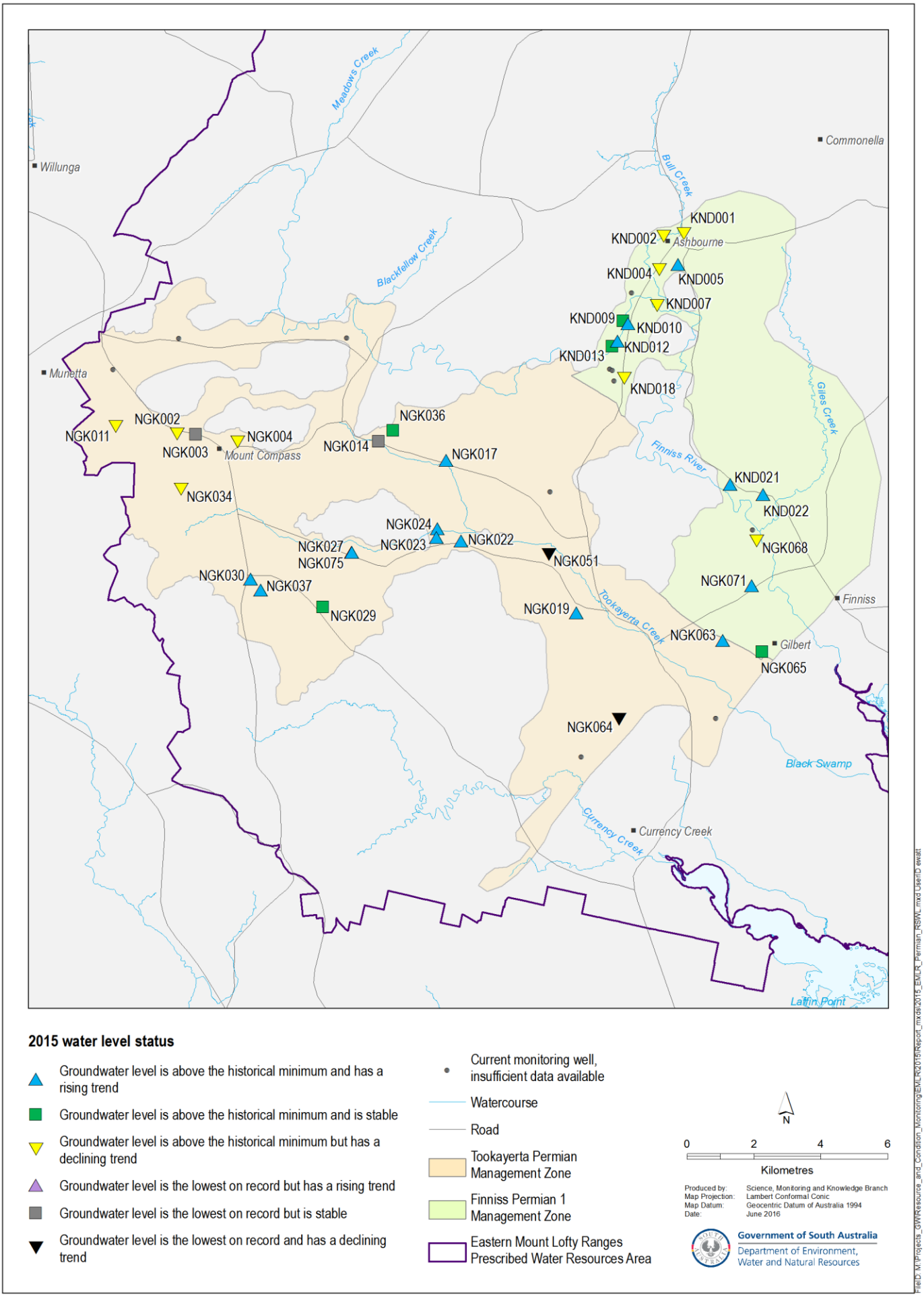


Figure 3. 2015 status of groundwater levels in the Permian Sand aquifer (EMLR Prescribed Water Resources Area) based on five-year trends from 2011 to 2015

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