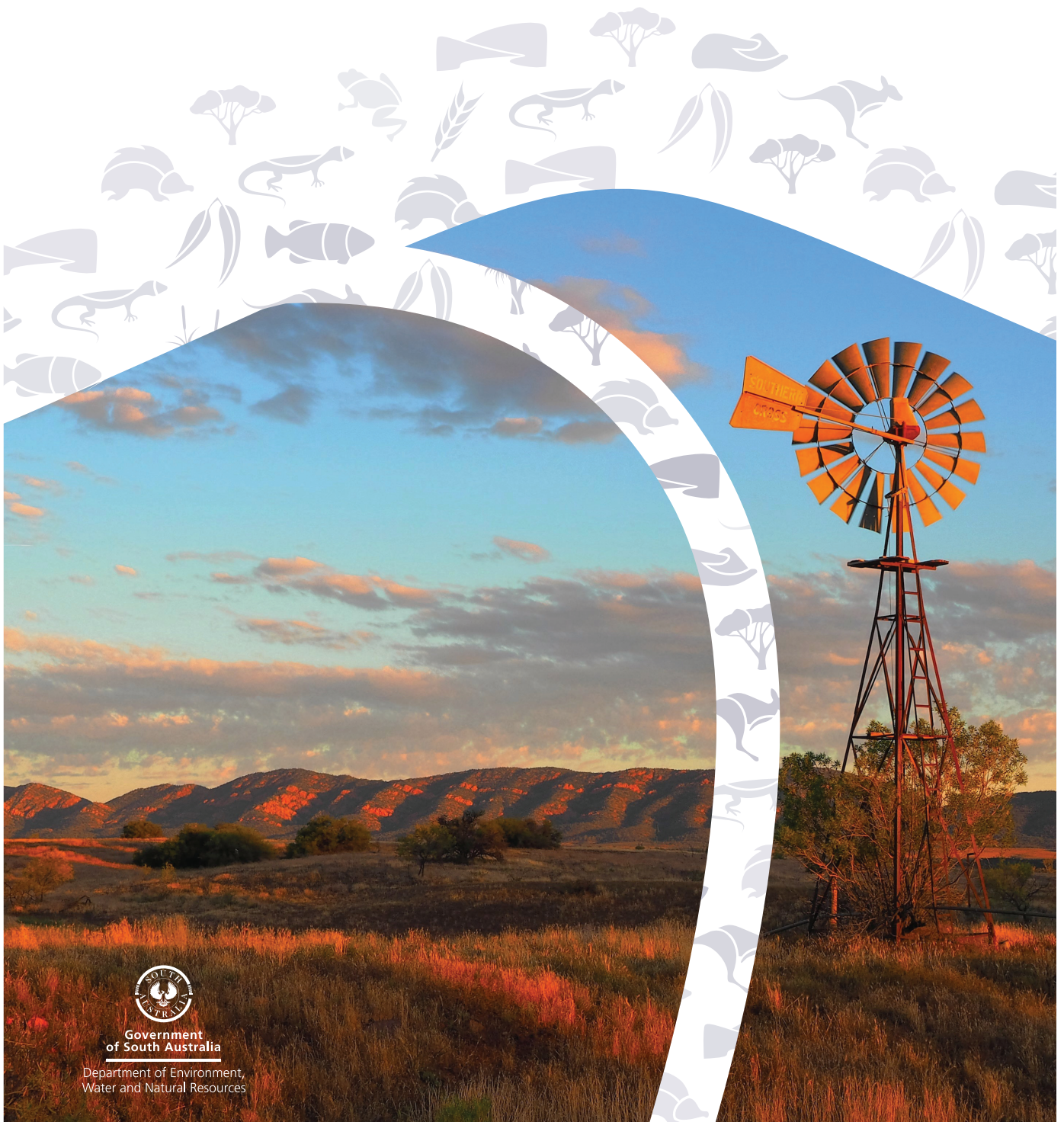


Eastern Mount Lofty Ranges PWRA Permian Sand aquifer

2016 Groundwater level and salinity status report



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of South Australia

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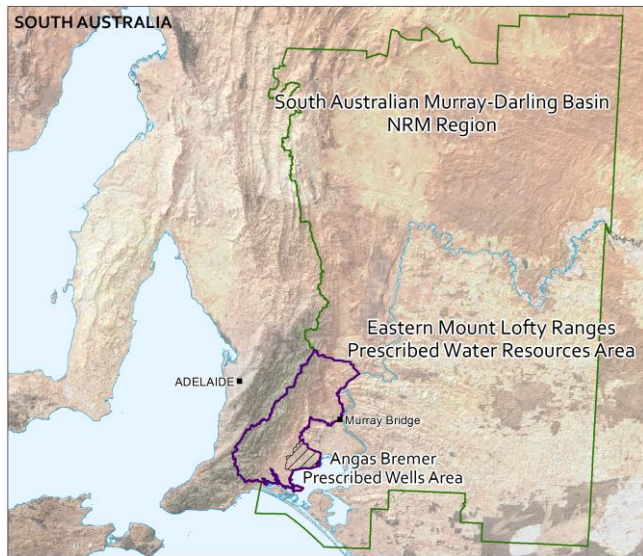
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Regional setting



The Eastern Mount Lofty Ranges (EMLR) Prescribed Water Resources Area (PWRA) lies within the South Australian Murray-Darling Basin Natural Resources Management Region and is located about 50 km east of Adelaide. It is a regional-scale resource for which groundwater, surface water and watercourse water are prescribed under the *Natural Resources Management Act 2004* (SA) and a Water Allocation Plan (WAP) provides for the sustainable use of the region's water resources. The Angas Bremer Prescribed Wells Area (PWA) is located within the boundaries of the EMLR PWRA and a stand-alone groundwater level and salinity status report has been prepared for this PWA (please visit the *Water Resource Assessments* page on [WaterConnect](#)).

There are three main sedimentary groundwater systems in the EMLR PWRA: the Permian Sand, Murray Group Limestone and Quaternary aquifers. This report focuses on the Permian Sand aquifer, in

particular within the Tookayerta and Finniss Permian 1 Management Zones (Fig. 1), which are defined in the WAP. The Permian Sand aquifer, also known as the Cape Jervis Formation, was deposited in several large U-shaped valleys that have been incised into basement rock (the Kanmantoo Group). 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 the Mt Compass town water supply.

Trends in groundwater levels 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 may cause salinities to increase. Conversely, increases in rainfall may result in increases in recharge, decreases in irrigation extractions and groundwater levels may rise and salinities stabilise or decline.

2016 Status

Tookayerta Permian Management Zone

The Permian Sand aquifer in the Tookayerta Permian Management Zone of the Eastern Mount Lofty Ranges Prescribed Water Resources Area 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 Tookayerta Permian Management Zone is based on:

- most monitoring wells (85%) show a five-year trend of stable or rising groundwater levels.

Although a green status has been assigned, it is acknowledged that groundwater levels in some areas have fallen to their lowest level on record.

Finniss Permian 1 Management Zone

The Permian Sand aquifer in the Finniss Permian 1 Management Zone of the Eastern Mount Lofty Ranges Prescribed Water Resources Area 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 Finniss Permian 1 Management Zone is based on:

- most monitoring wells (81%) show a five-year trend of stable or rising groundwater levels.

While the Finniss Permian 1 Management Zone has been assigned a green status for 2016, localised instances of declining groundwater levels are acknowledged.

Rainfall

Ashbourne rainfall station (BoM station 23701) was chosen for analysis due to its central location among monitoring wells between the two management zones. Rainfall at Ashbourne totalled 480 mm in the 2015–16 water-use year, 26% below the long-term annual average rainfall of 648 mm (1900–2016) and 15% less than the five-year average annual rainfall of 563 mm (2011–16) (Figs 1 and 2). In the 2015–16 water-use year, all months recorded rainfall which is below their respective long-term monthly average, with the exception of January, February, and May, which recorded substantial above-average rainfall compared to their monthly average. Across the PWRA, trends of declining rainfall are evident over the past five years and over the longer term (Fig. 1).

Water use

The Eastern Mound Lofty Ranges PWRA has a total extraction limit of 36 323 ML across all aquifers, of which 31 207 ML has been allocated. In previous years, water use was estimated based on land-use surveys of irrigated properties and the theoretical irrigation requirements for various crops. Due to uncertainties in these estimates, a time-series analysis of water use has been omitted from this report. More recently, changes in the way water is managed across the region have required licensed water users to measure their water use. By 2015–16, 60% of water licensees had installed water meters and submitted water usage data. Metered extractions

from the Permian Sand aquifer within the Tookayerta Permian and Finniss Permian 1 Management Zones totalled 2171 ML¹ and this represents 45% of their combined extraction limit of 4775 ML.

Groundwater levels

In the five years to 2016, and within the Tookayerta Permian Management Zone, 17 out of 20 groundwater monitoring wells (85%) show a trend of rising or stable groundwater levels (Fig. 3). Rates of rise range between 0.08 and 0.65 m/y with a median of 0.14 m/y. The remaining wells (15%) show a five-year trend of declining groundwater levels, at rates that range between 0.05 and 0.42 m/y. Notably, six monitoring wells (30%) show their lowest groundwater level on record in 2016 (Fig. 3).

Over the same five-year period within the Finniss Permian 1 Management Zone, 13 out of 16 monitoring wells (81%) show a trend of rising or stable groundwater levels. Rates of rise range between 0.02 and 0.37 m/y with a median of 0.07 m/y. The remaining wells (19%) show a falling trend at rates that range between 0.03 and 0.25 m/y. These wells are mostly located near the township of Ashbourne.

Groundwater salinity

The groundwater salinity was not regularly measured in the past for the Permian Sand aquifer of EMLR PWRA and as such, due to the paucity of data, salinity has not been used when assessing the status of the resource in this report. However, the salinity of the Permian Sand aquifer typically measures less than 1000 mg/L.

Each year since 2015, irrigators in the EMLR PWRA have submitted groundwater samples from their irrigation wells to the Department of Environment, Water and Natural Resources for salinity testing. The increasing coverage of salinity measurements in the area will greatly assist in assessing long-term changes in groundwater salinity and its spatial distribution. To ensure these salinity data meet Quality Assurance standards, annual measurements over four to five years will be required from each well. Once validated, salinity data will be reported in groundwater level and salinity status reports².

¹ The licensed groundwater extraction volume for the 2015–16 water-use year is based on the best data available as of March 2017 and may be subject to change, as some extraction volumes are in the process of being verified; installation of water meters by licensed users is still in progress across the EMLR PWRA.

² The salinity data collected from irrigation wells can be viewed at [Groundwater Data](#) or via [WaterConnect](#).

More information

To determine the status of the Permian Sand aquifer in the Tookayerta Permian and Finniss Permian 1 Management Zones for 2016, the trend in groundwater levels over the past five years (2012 to 2016, inclusive) was 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 *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](#).

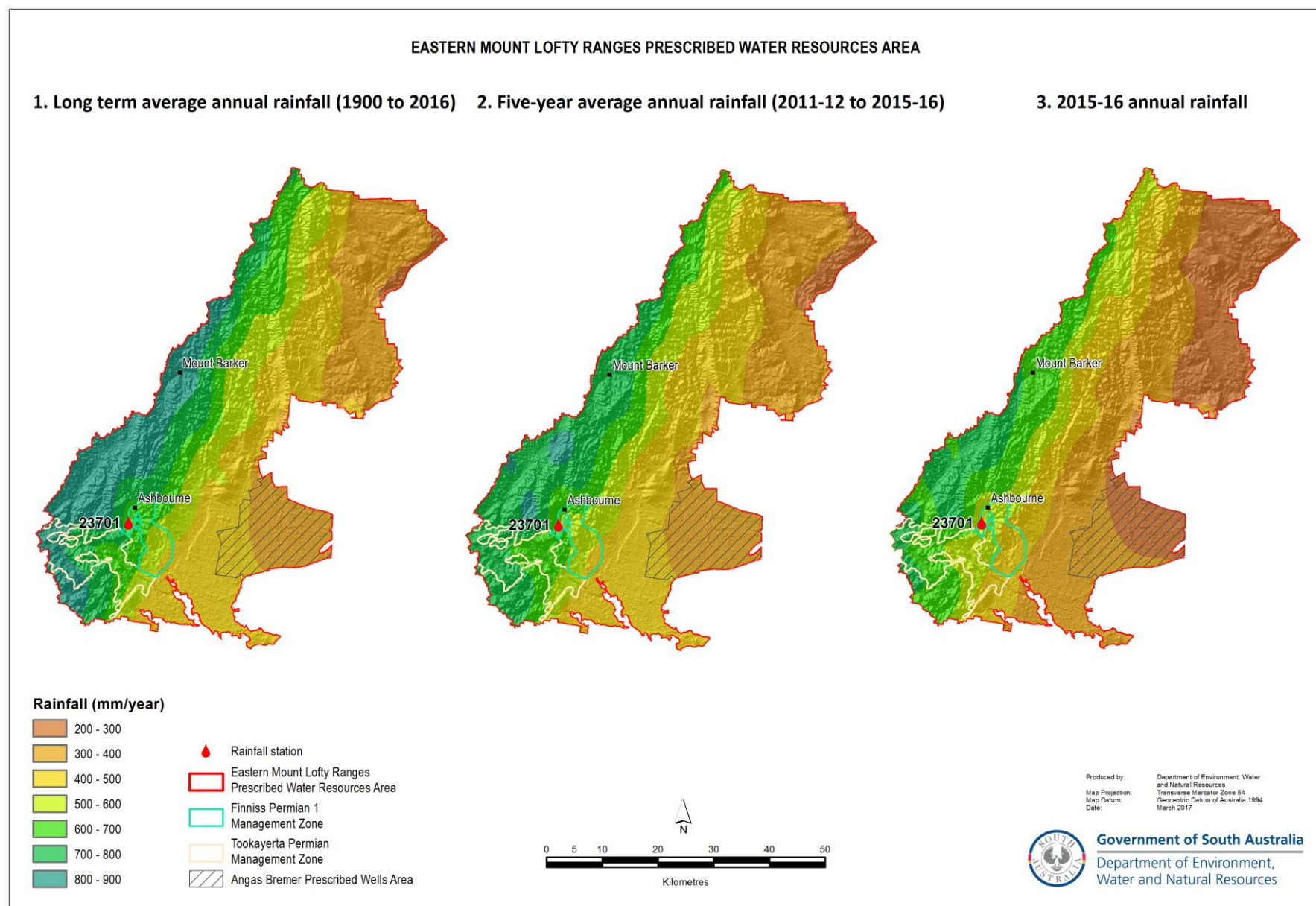


Figure 1. (1) Long-term and (2) five-year average annual rainfall and (3) annual rainfall for the 2015–16 water-use year in the EMLR PWRA³

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.

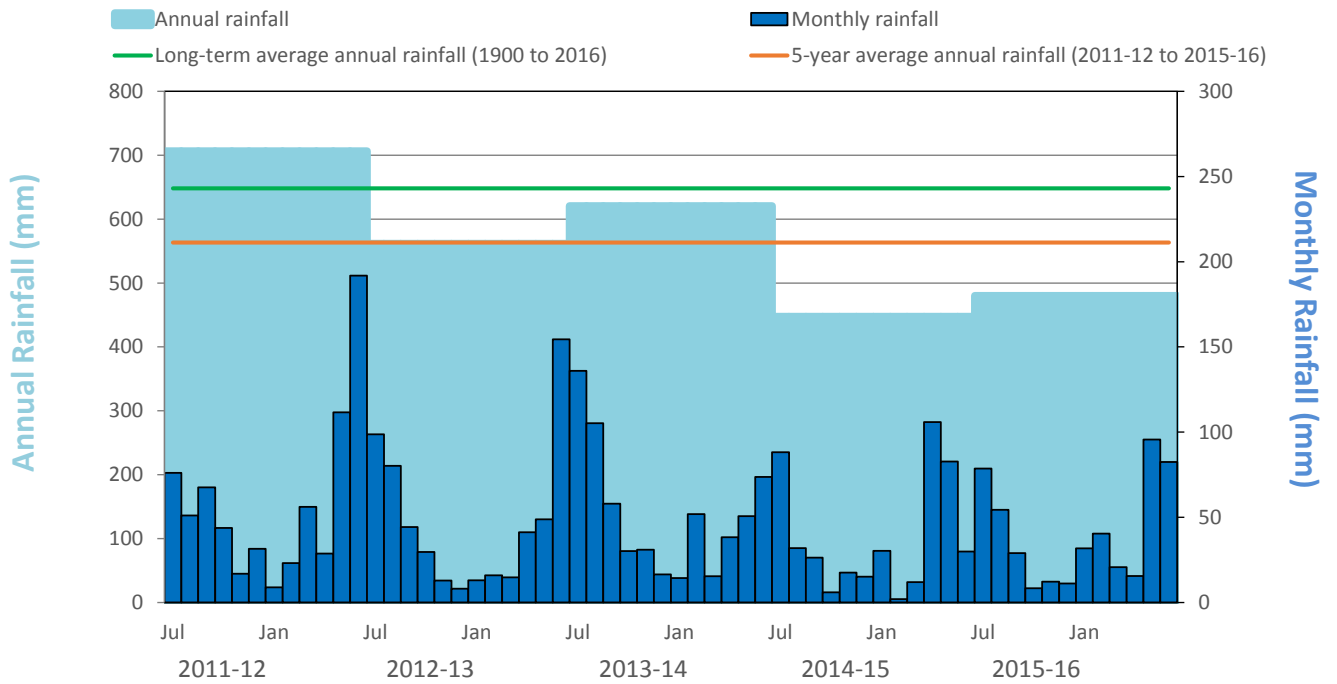


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Ashbourne (BoM Station 23701)⁴

⁴ 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.

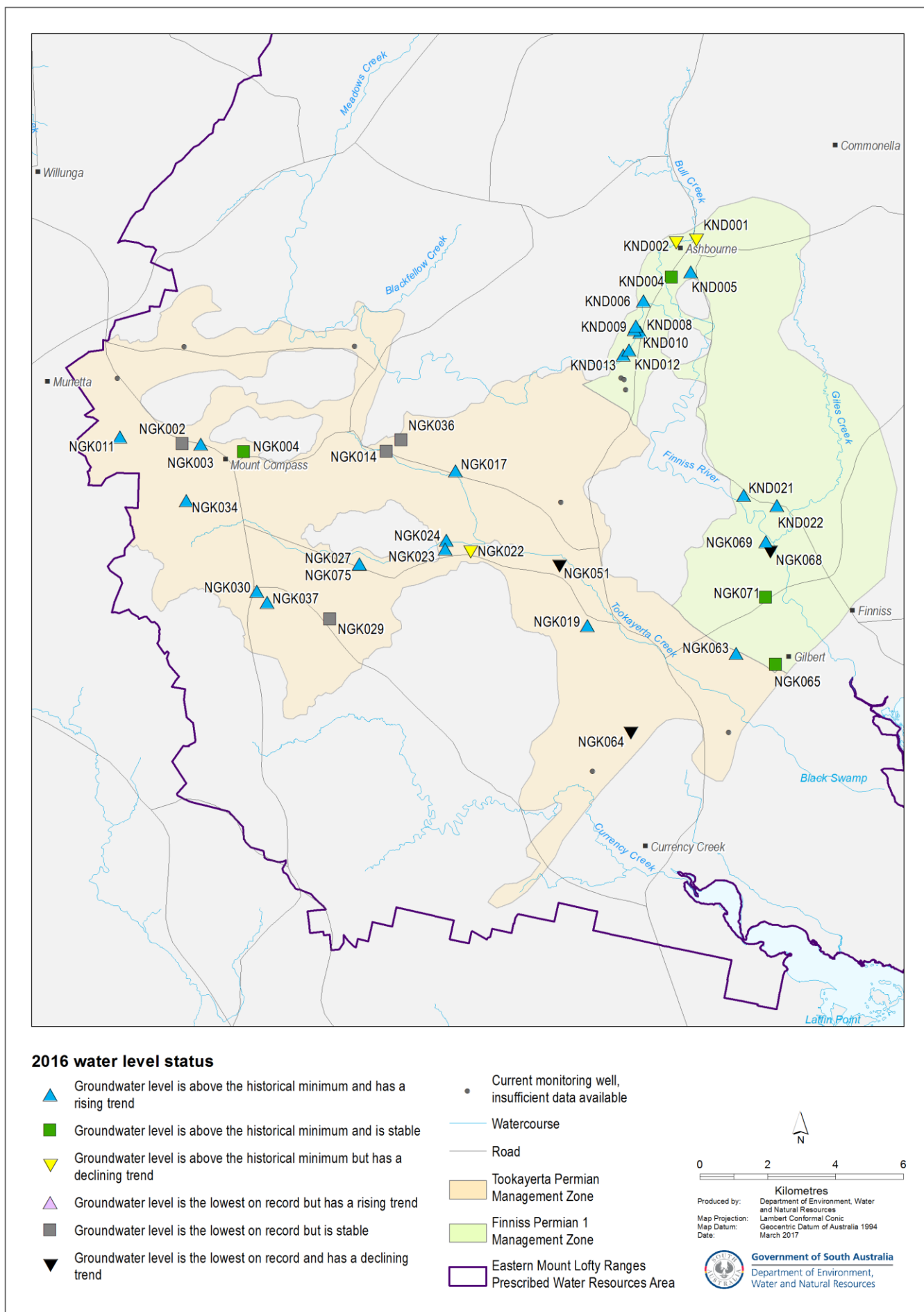


Figure 3. 2016 status of groundwater levels in the Permian Sand aquifer (Eastern Mount Lofty Ranges PWRA), based on five-year trends from 2012 to 2016



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