

# Eastern Mount Lofty Ranges PWRA

## Permian Sand aquifer

2014 Groundwater level and salinity status report



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# 2014 Summary



The Eastern Mount Lofty Ranges Prescribed Water Resources Area (EMLR PWRA) is located about 50 km east of Adelaide in the South Australian Murray–Darling Basin NRM Region and covers an area of approximately 2845 km<sup>2</sup>. It incorporates the Murray Plains and eastern slopes of the Mount Lofty Ranges and lies within the Murray-Darling Basin. It is a regional-scale prescribed resource for which groundwater is protected and managed under South Australia's *Natural Resources Management Act 2004*. The *Water Allocation Plan for the Eastern Mount Lofty Ranges* (the WAP) provides for the sustainable use of the water resources. The Angas Bremer Prescribed Wells Area (PWA) is located within the boundaries of the EMLR PWRA and a separate groundwater level and salinity status report has been prepared for this PWA and can be found on the [WaterConnect](#) website.

The EMLR PWRA is characterised by fractured rock and sedimentary aquifers that are of varying age, water quality and yield. The fractured rock aquifers occur in the west of the PWRA, where groundwater is stored and moves through joints and fractures in the basement rocks forming the ranges. Sedimentary aquifers occur in the valleys and plains to the east, where groundwater flows through the pore spaces within the sediments. Recharge to these aquifers occurs directly from the portion of rainfall that percolates down to the watertable through the soil profile and, in the case of the confined sedimentary aquifers, indirectly by throughflow from adjacent aquifers.

There are three types of sedimentary aquifers in the EMLR PWRA, namely the Permian Sand, Murray Group Limestone and Quaternary aquifers. This report focuses on the Permian Sand aquifer (PSA), also known as the Cape Jervis Formation, which is found in several large U-shaped valleys carved into 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 Mount Lofty Ranges and underlies the Tertiary Murray Group Limestone and Quaternary sediments on the Murray Plains. The aquifer can be highly permeable resulting in high yields and low salinities. However, in some areas there is a high clay content and the aquifer is low yielding and has relatively high salinity. Despite this variability, the Permian Sand aquifer is widely developed for localised irrigation and town water supply.

Despite being a confined aquifer that does not receive direct recharge from rainfall, the intensity and timing of rainfall and subsequent extraction practises can have an effect on groundwater levels and salinity in the PSA aquifer. For example, if the EMLR PWRA experienced above-average rainfall during typically dry summer months, this could result in less groundwater being extracted from the PSA aquifer for irrigation purposes and therefore smaller declines in groundwater levels and stable or improving salinity.

The climate of the EMLR PWRA is characterised as Mediterranean with hot, dry summers and cool, wet winters. Ashbourne rainfall station (number 23701) was chosen as part of the analysis due to its central location among monitoring wells in the south of the region. The total annual rainfall at Ashbourne for 2014 was 429 mm, 222 mm below the long-term (1889–2014) average of 651 mm. While February rainfall was more than double the long-term monthly average, rainfall was below average for the remainder of the year, particularly from August to December (Fig. 1).

Extensive metered groundwater extraction data are not yet available for the EMLR PWRA; however, it is estimated that approximately 32 100 ML is required each year from all aquifers of the PWRA (excluding the Angas Bremer PWA). This estimation is based on land and water-use surveys of agricultural properties and the theoretical irrigation requirements for various crops. It should be noted that this is an estimation and that actual current groundwater extraction may be different. The estimated demand is below the calculated sustainable yield for the EMLR PWRA of 38 757 ML/y (excluding the Angas Bremer PWA). However, at a local scale within the EMLR PWRA, the estimated demand may exceed the calculated sustainable yield, such as from the Permian Sand aquifer within the Tookayerta Creek catchment.

In the Tookayerta Permian Management Zone, long-term monitoring records show groundwater levels have been stable since 2004.

There were sufficient data from 19 observation wells to assess the annual trend in maximum recovered groundwater levels from 2013 to 2014. Nine of these wells recorded increases of between 0.11 m to 0.42 m, with a median 0.24 m increase, while seven recorded decreases of between 0.12 to 0.93 m, with a median 0.3 m decrease. Negligible change was recorded in three observation wells, where the change in maximum recovered water level between 2013 and 2014 was less than 0.1 m (Fig. 2). The median change from 2013 to 2014 was an increase of 0.07 m.

In the Finniss Permian 1 Management Zone, the change in maximum recovered groundwater levels from 2013 to 2014 was determined for 13 observation wells. Decreases of between 0.2 to 1.11 m were observed in 12 of these wells, while one well had no significant change between 2013 and 2014. There was a median decrease in groundwater levels across the management zone of 0.59 m. Declining groundwater levels were mostly concentrated in the area south of Ashbourne (Fig. 2) and may relate to increased groundwater extraction.

Groundwater salinity of the Permian Sand aquifer is not routinely monitored, but is typically less than 1000 mg/L; one sample returned for 2014 had a salinity of 275 mg/L. Due to the lack of data to assess the annual trend, salinity was not used in the assessment of the status of the Permian Sand aquifer.

## 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 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. no significant change) or improving over the 12-month reporting period. Continuation of these changes favours a very low likelihood of negative impacts on beneficial uses such as drinking water, irrigation or stock watering.

The 2014 status for the Permian Sand aquifer in the Tookayerta Management Zone of the Eastern Mount Lofty Ranges PWRA is supported by:

- an overall rise in the maximum recovered groundwater level when compared to 2013 water level data.

## 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 yellow status for 2014:

### 2014 Status



“Gradual adverse changes, indicating low risk to the resource in the medium term”

This means that minor adverse changes in the resource status have been observed over the 12-month reporting period. If these conditions were to continue, they are unlikely to negatively impact the beneficial use of the resource for at least 15 years.

The 2014 status for the Permian Sand aquifer in Finniss Permian 1 Management Zone of the Eastern Mount Lofty Ranges PWRA is supported by:

- a localised, declining change in maximum recovered groundwater levels in the area south of Ashbourne.

To view descriptions for all status symbols, please visit [WaterConnect](#).

To view the *Eastern Mount Lofty Ranges Prescribed Water Resources Area Groundwater Level and Salinity Status Report 2011*, which includes background information on hydrogeology, location of rainfall stations and relevant groundwater-dependent ecosystems, please visit [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](#).

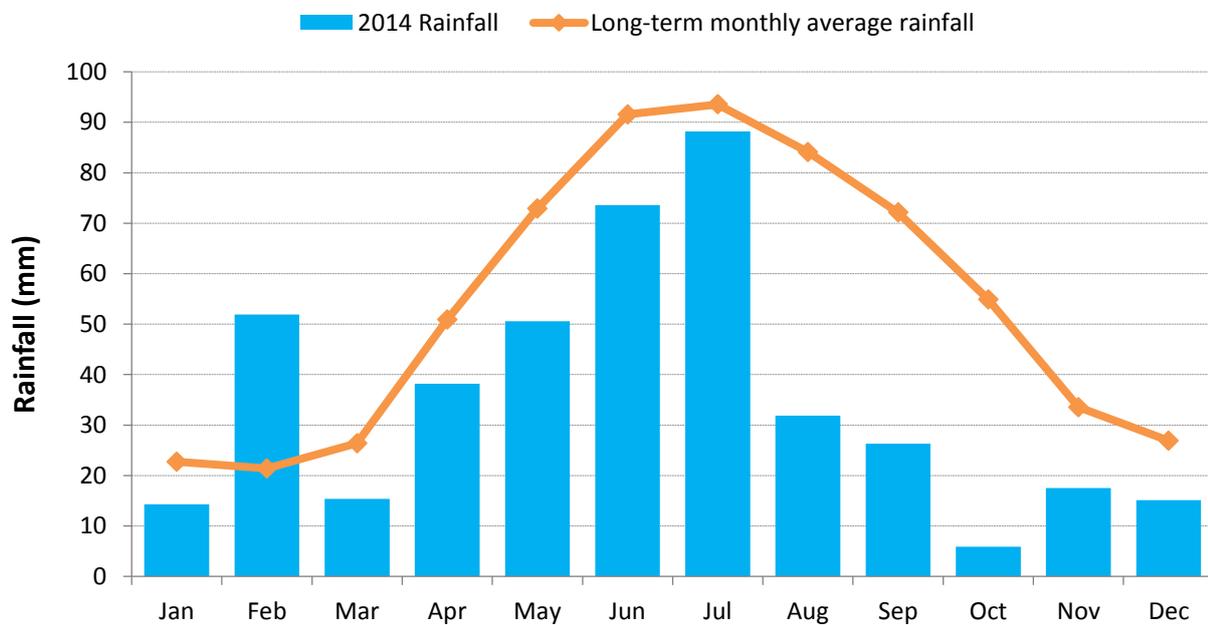


Figure 1. Monthly rainfall (mm) for 2014 and the long-term average monthly rainfall (mm) at the Ashbourne rainfall station<sup>1</sup> (number 23701) in the Eastern Mount Lofty Ranges Prescribed Water Resources Area

<sup>1</sup> 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](http://www.longpaddock.qld.gov.au/silo).

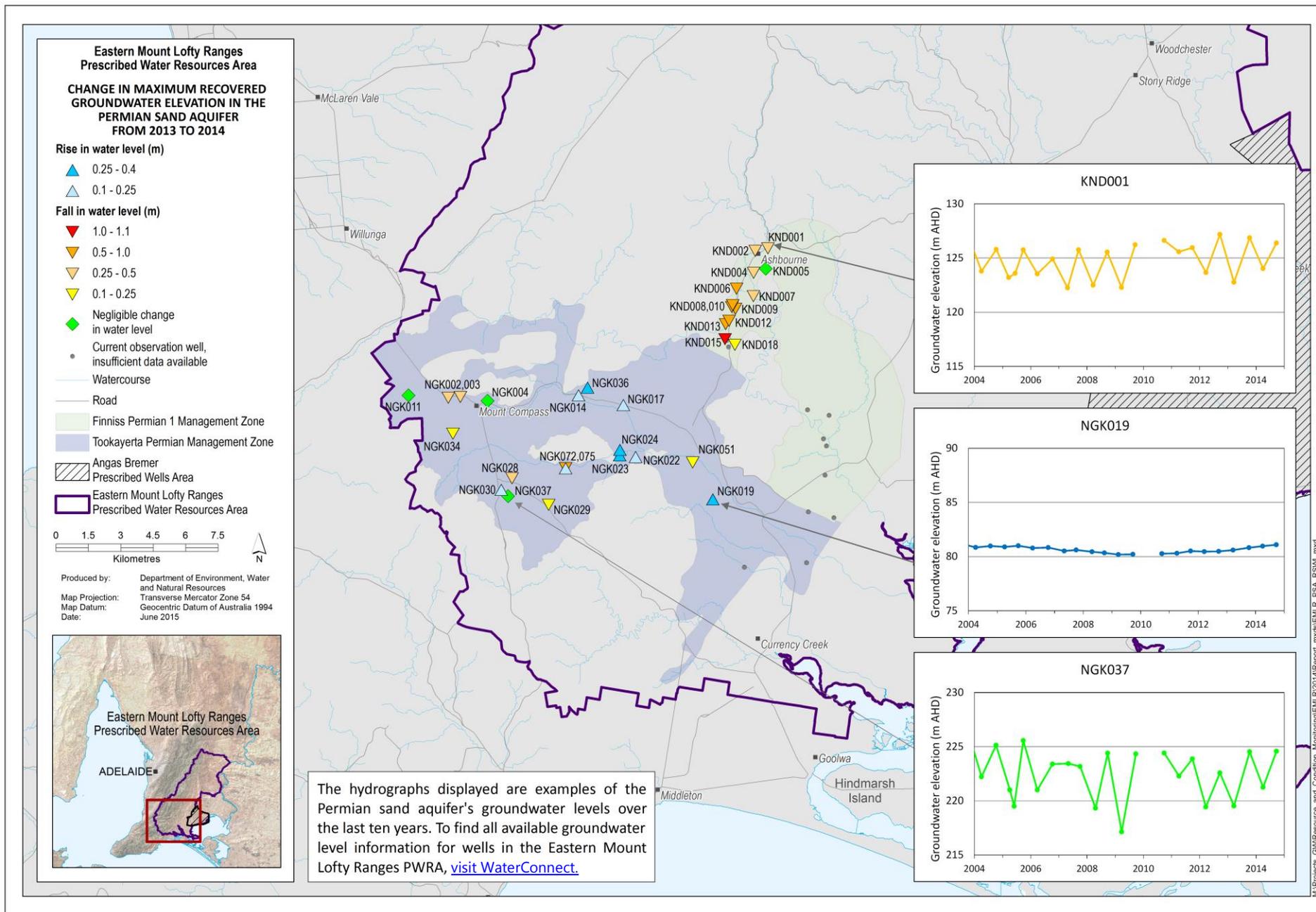


Figure 2. Overall changes in maximum groundwater levels of the Permian Sand aquifer in the Eastern Mount Lofty Ranges Prescribed Water Resources Area from 2013 to 2014