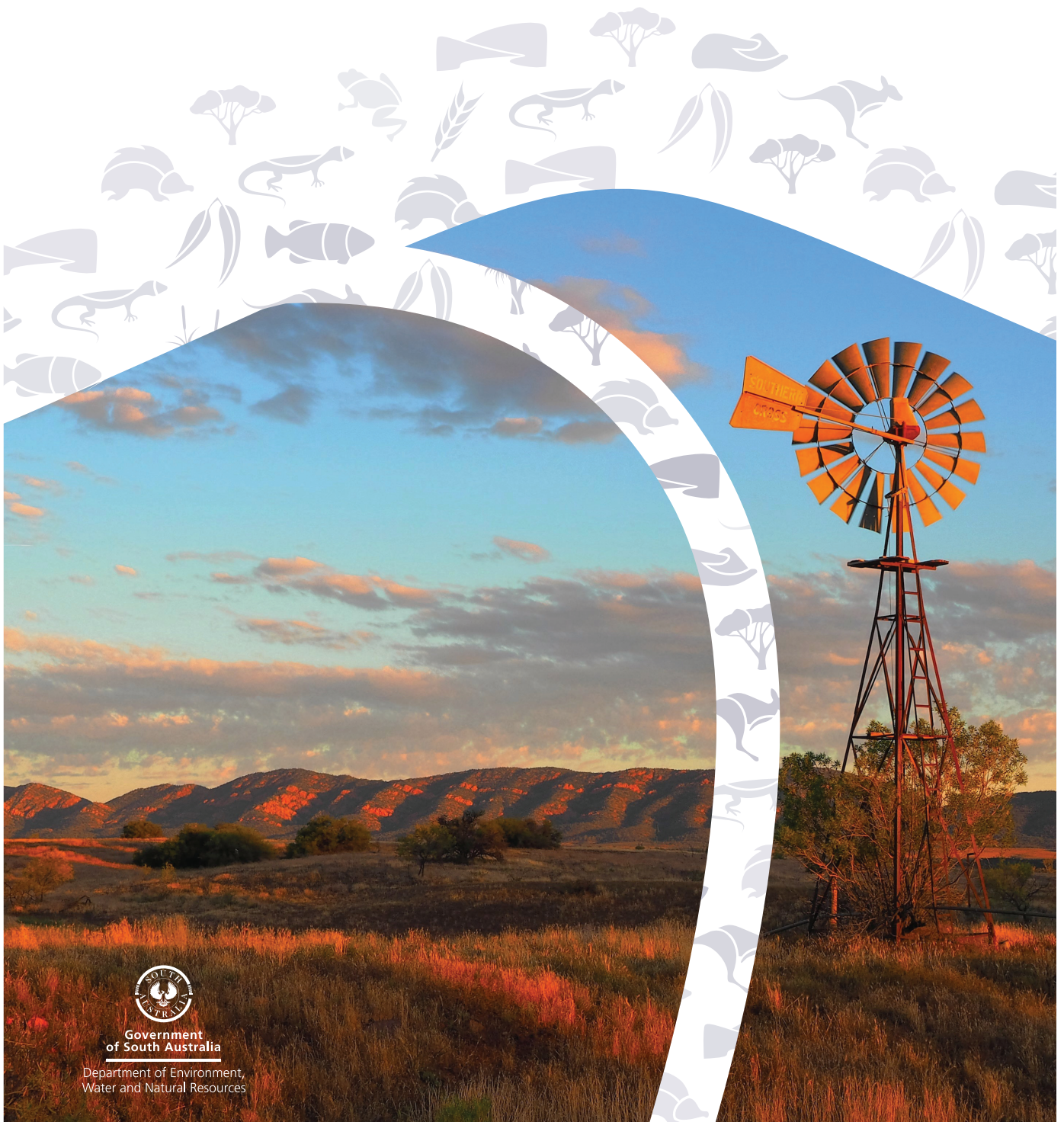


Central Adelaide PWA T1 aquifer

2016 Groundwater level and salinity status report



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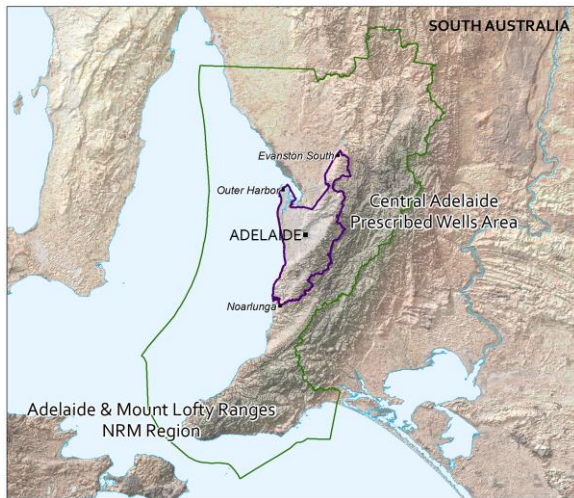
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Regional setting



The Central Adelaide Prescribed Wells Area (PWA) encompasses the Adelaide metropolitan region, extending from Outer Harbour and Evanston South in the north to Noarlunga in the south, and lies within the Adelaide and Mount Lofty Ranges Natural Resources Management Region. It is prescribed under South Australia's *Natural Resources Management Act 2004* and a water allocation plan is currently in development.

The Central Adelaide PWA comprises several sedimentary and fractured rock aquifers. Most groundwater extractions in the PWA occur from the T1 aquifer, the shallowest sedimentary aquifer of Tertiary age, and this aquifer is the focus of this report. Due to the limited extractions from other aquifers in the PWA, they are omitted from this report.

The T1 aquifer primarily comprises Hallett Cove Sandstone, Dry Creek Sand and limestone of the upper Port Willunga Formation. The direction of groundwater flow is from the Adelaide Hills to the Gulf St Vincent. The main source of recharge is thought to be from lateral throughflow from the fractured rock aquifers of the Mount Lofty Ranges. The T1 aquifer can be divided into two main areas: the Adelaide Plains Sub-basin and the Golden Grove Embayment, which are separated by the Para Fault. The aquifer differs significantly in thickness and extent between these two provinces. In the Golden Grove Embayment (east of the Para Fault), the T1 aquifer occurs as a semi-confined or unconfined aquifer and is relatively thin. In the Adelaide Plains sub-basin (west of the Para Fault), the aquifer is thicker, but also more uniform and continuous in terms of thickness and spatial distribution, and consequently, most groundwater extraction from the T1 aquifer occurs from this province. The T1 aquifer is generally confined, except where it becomes shallow or outcrops in the Golden Grove Embayment, particularly south and north of the River Torrens, and in proximity to the Eden–Burnside Fault.

Despite the generally confined nature of the T1 aquifer, which does not receive direct recharge from local rainfall, the intensity and timing of rainfall (and related variations in rates of groundwater extraction) can have an effect on groundwater pressure levels and salinities. For example, if the Central Adelaide PWA experienced above-average rainfall, this could result in less groundwater being extracted from the T1 aquifer for irrigation purposes, and rises in groundwater pressure levels might result.

2016 Status

The T1 aquifer of the Central Adelaide Prescribed Wells Area has been assigned a green status for 2016:

2016 Status



Positive trends have been observed over the past five years

The 2016 status for the T1 aquifer is based on:

- most monitoring wells (87%) show a five-year trend of rising or stable groundwater pressure levels.

Rainfall

There is a strong gradient in long-term average annual rainfall across the Central Adelaide PWA, ranging from 374 mm at Seaton (BoM Station 23024) near the coast, to 443 mm in the North Adelaide (BoM Station 23011) and 825 mm at Cherry Gardens (BoM Station 23709) in the Adelaide Hills. During the 2015–16 water-use year, the North Adelaide rainfall station recorded 443 mm of rainfall, 19% less than long-term average annual rainfall of 544 mm and 3% less than 5-year average of 458 mm (Figs 1 and 2).

Water use

Although the Central Adelaide PWA is prescribed, licences have not yet been issued and there is currently only limited metering of extractions. The most recent estimate of use from all aquifers in the Adelaide metropolitan area, which is located in the Adelaide Plains Sub-basin, is 10,000–12,000 ML/y. Groundwater extraction from the T1 aquifer is concentrated near the West Lakes–Grange area where there is seasonal irrigation (primarily irrigation of open spaces). Long-standing cones of depressions in the groundwater pressure level potentiometric surface have formed in these areas (Fig. 3), but long-term groundwater level trends appear to have stabilised, suggesting a new equilibrium has been established.

Groundwater pressure levels

Groundwater pressure level fluctuations in the T1 aquifer can be divided into two groups: summer irrigation extraction and year-round industrial extraction. Summer irrigation extraction causes major seasonal fluctuations, with declines in groundwater pressure levels during summer and the recovery of levels in winter. Industrial extractions occur all year round, and although seasonal fluctuations are smaller than those resulting from summer irrigation, there is no opportunity for groundwater pressure levels to fully recover, and consequently the result is a long-standing cone of depression. This has occurred for example, near Osborne, Thebarton and Regency Park (Fig. 3).

Over the past five years, most monitoring wells (87%) show a trend of rising or stable groundwater pressure levels (Fig. 4). Rises ranged between 0.04 and 1.75 m/y with a median of 0.47 m/y. The remaining 13% of wells show a trend of declining groundwater pressure levels ranging from 0.04 m/y to 0.19 m/y, with a median of 0.13 m/y. Wells showing a declining trend are mainly located near the Hope Valley Fault (Fig. 4).

Groundwater salinity

In 2016, the T1 aquifer salinity ranged from 829 to 4164 mg/L with five out of 15 monitoring wells recording salinities of more than 1500 mg/L (Fig. 5). There is insufficient data available to conduct a five-year trend analysis of groundwater salinity and as such, salinity has not been considered in the assessment of the status for the T1 aquifer.

More information

To determine the status of the T1 aquifer for 2016, the trends in groundwater pressure levels 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 *Central Adelaide PWA 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 [WaterConnect](#).

To view or download groundwater level and salinity data from monitoring wells within the Central Adelaide PWA, please visit [Groundwater Data](#) on WaterConnect.

For further details about the Central Adelaide PWA, please see the Natural Resources Adelaide and Mount Lofty Ranges [website](#).

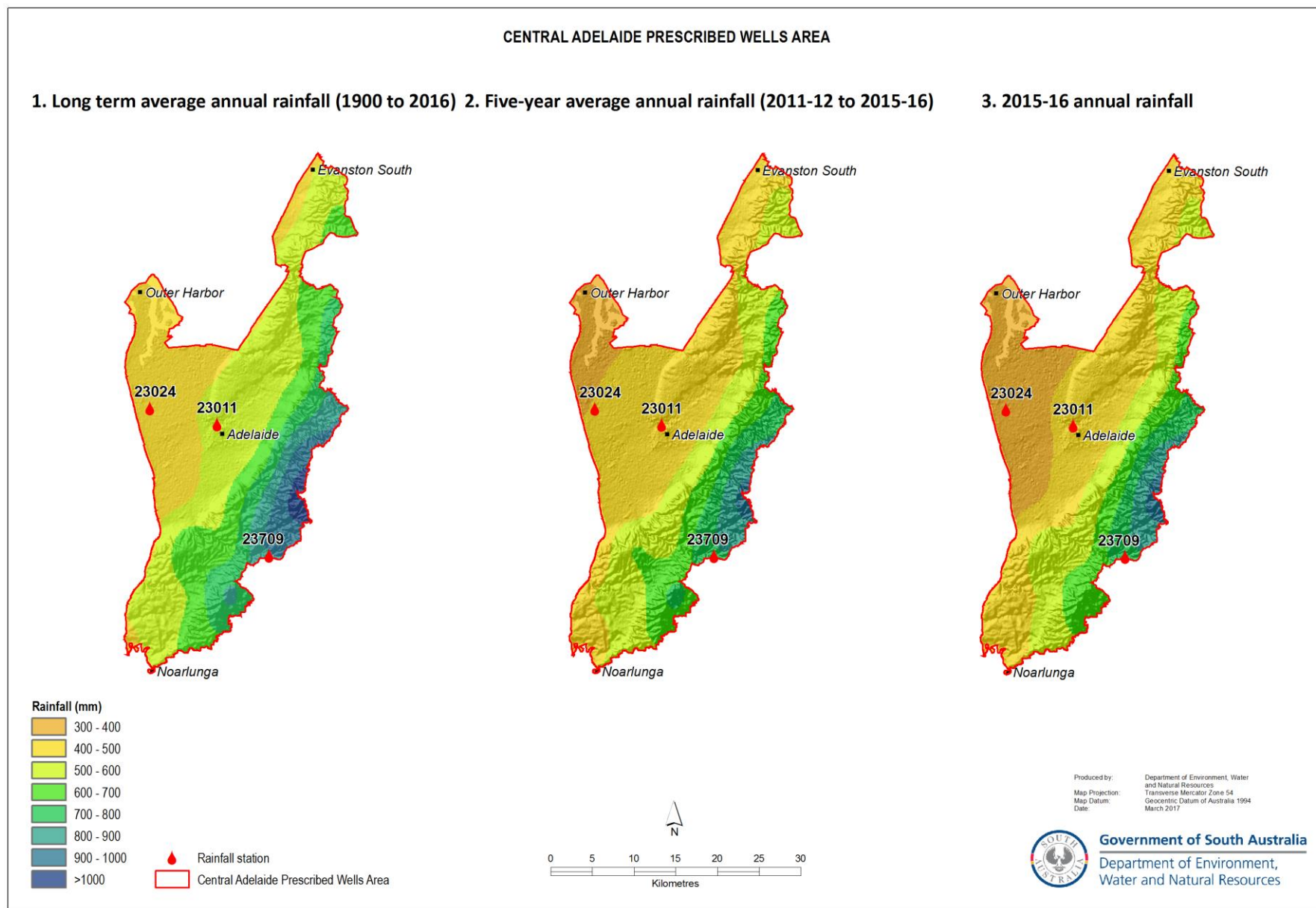


Figure 1. (1) Long-term and (2) five-year average annual rainfall and (3) annual rainfall for the 2015–16 water-use year in the Central Adelaide PWA¹

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.

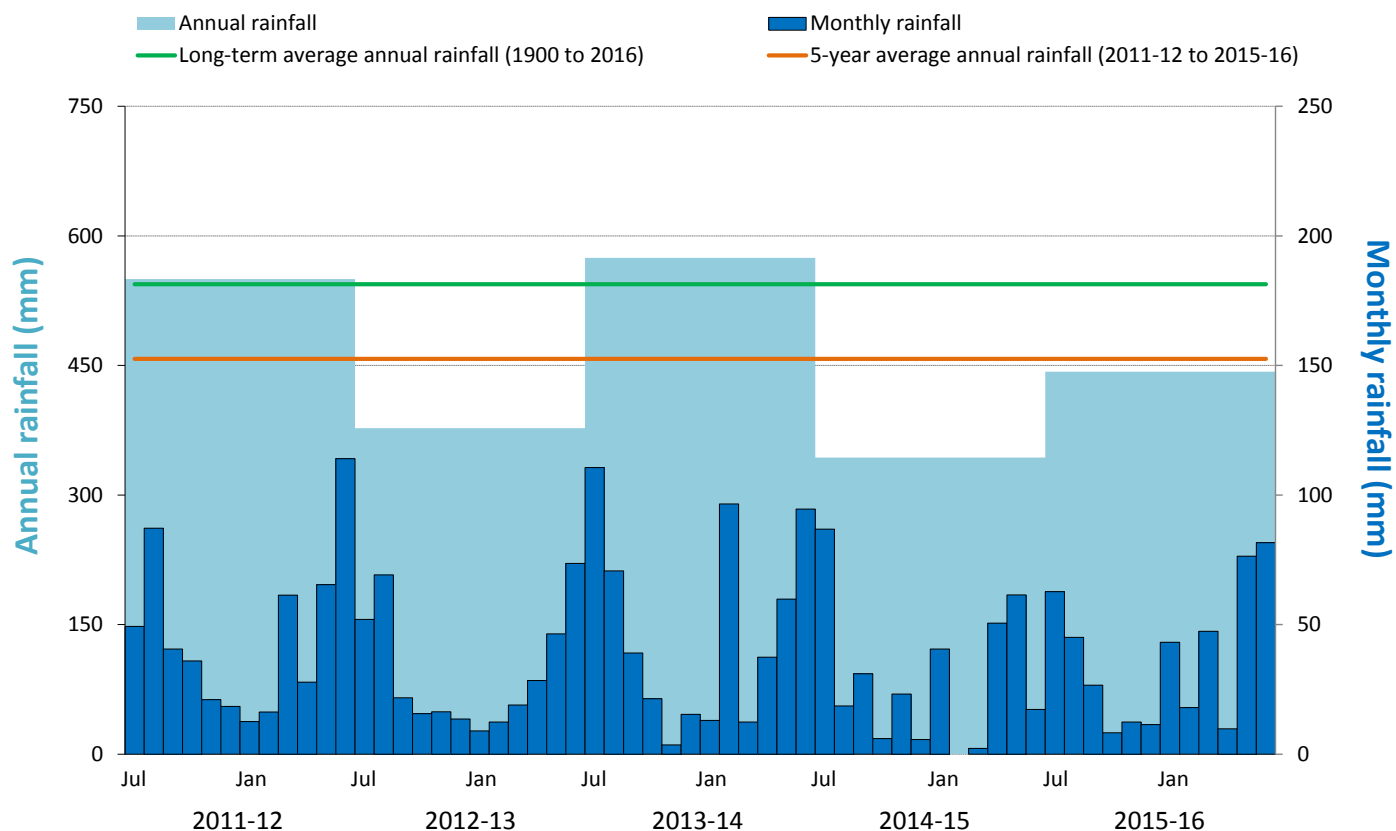
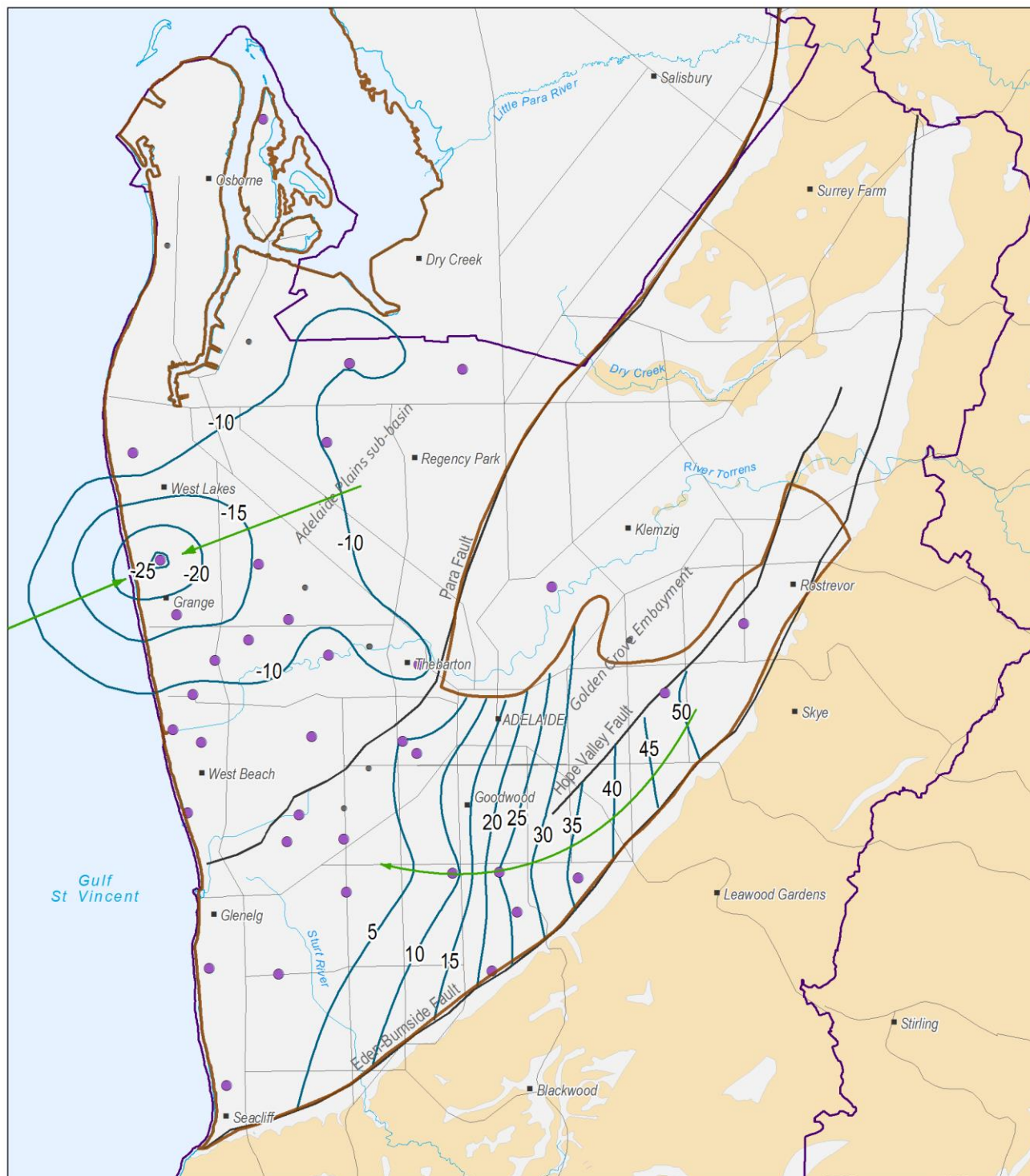


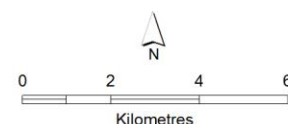
Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-yearly and long-term average annual rainfall recorded at North Adelaide (BoM Station 23011)²

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.



Potentiometric surface March 2016

- Groundwater elevation (m AHD)
- Groundwater flow direction
- ▭ Central Adelaide Prescribed Wells Area
- Fault
- Monitoring well
- Current monitoring well, insufficient data available
- Watercourse
- Road
- Basement outcrop
- ▭ Extent of T1 aquifer

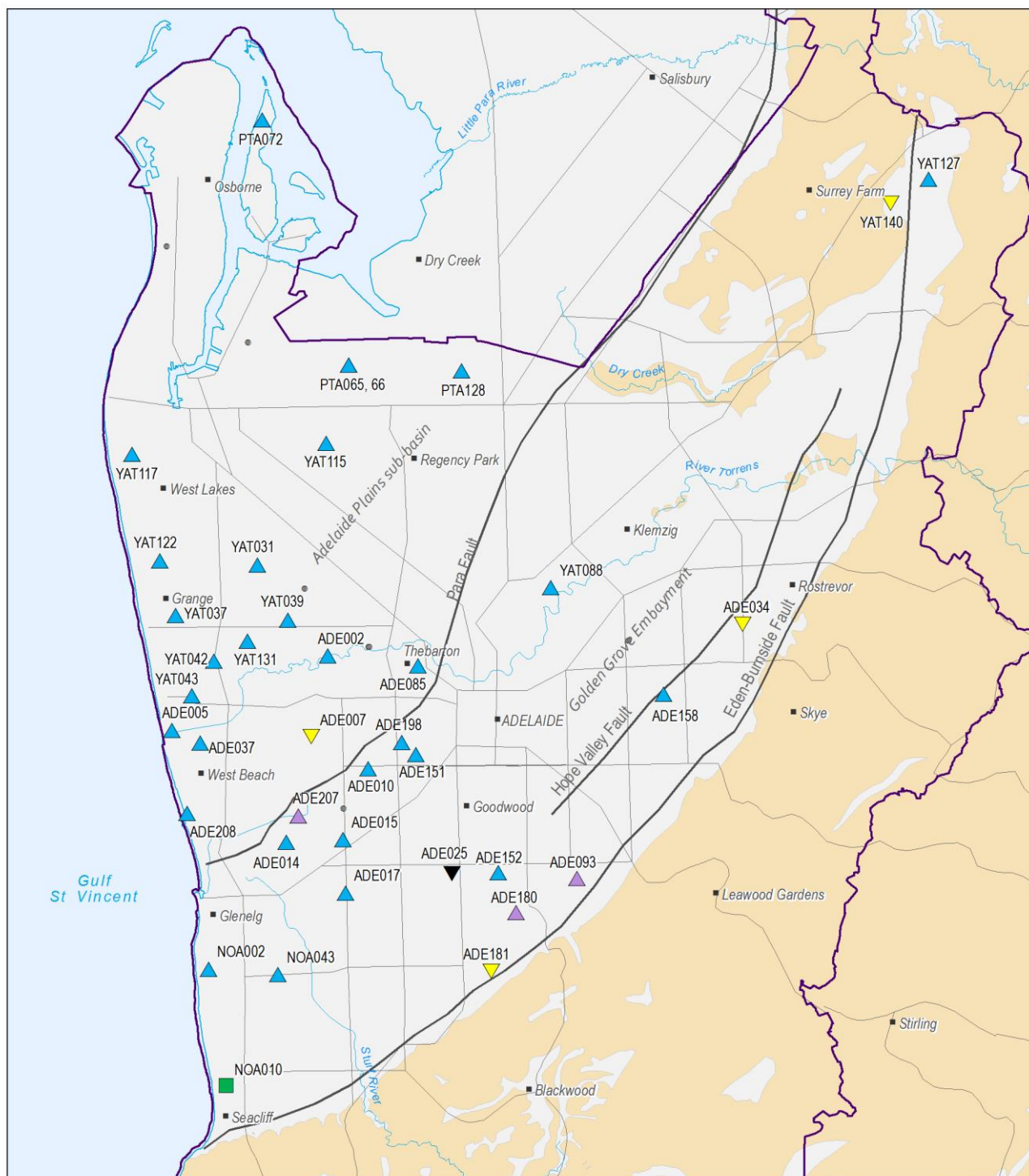


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 Map Projection: Transverse Mercator Zone 54
 Map Datum: Geocentric Datum of Australia 1994
 Date: February 2017



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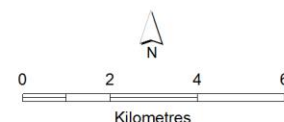
Figure 3. Potentiometric surface and direction of groundwater flow in the T1 aquifer (Central Adelaide PWA) in March 2016



2016 water level status

- ▲ Groundwater level is above the historical minimum and has a rising trend
- Groundwater level is above the historical minimum and is stable
- ▼ Groundwater level is above the historical minimum but has a declining trend
- ▲ Groundwater level is the lowest on record but has a rising trend
- Groundwater level is the lowest on record but is stable
- ▼ Groundwater level is the lowest on record and has a declining trend
- Current monitoring well, insufficient data available

- Fault
- Watercourse
- Road
- Basement outcrop
- Central Adelaide Prescribed Wells Area



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Figure 4. 2016 status of groundwater levels in the T1 aquifer (Central Adelaide PWA) based on the 5-year trend from 2012 to 2016

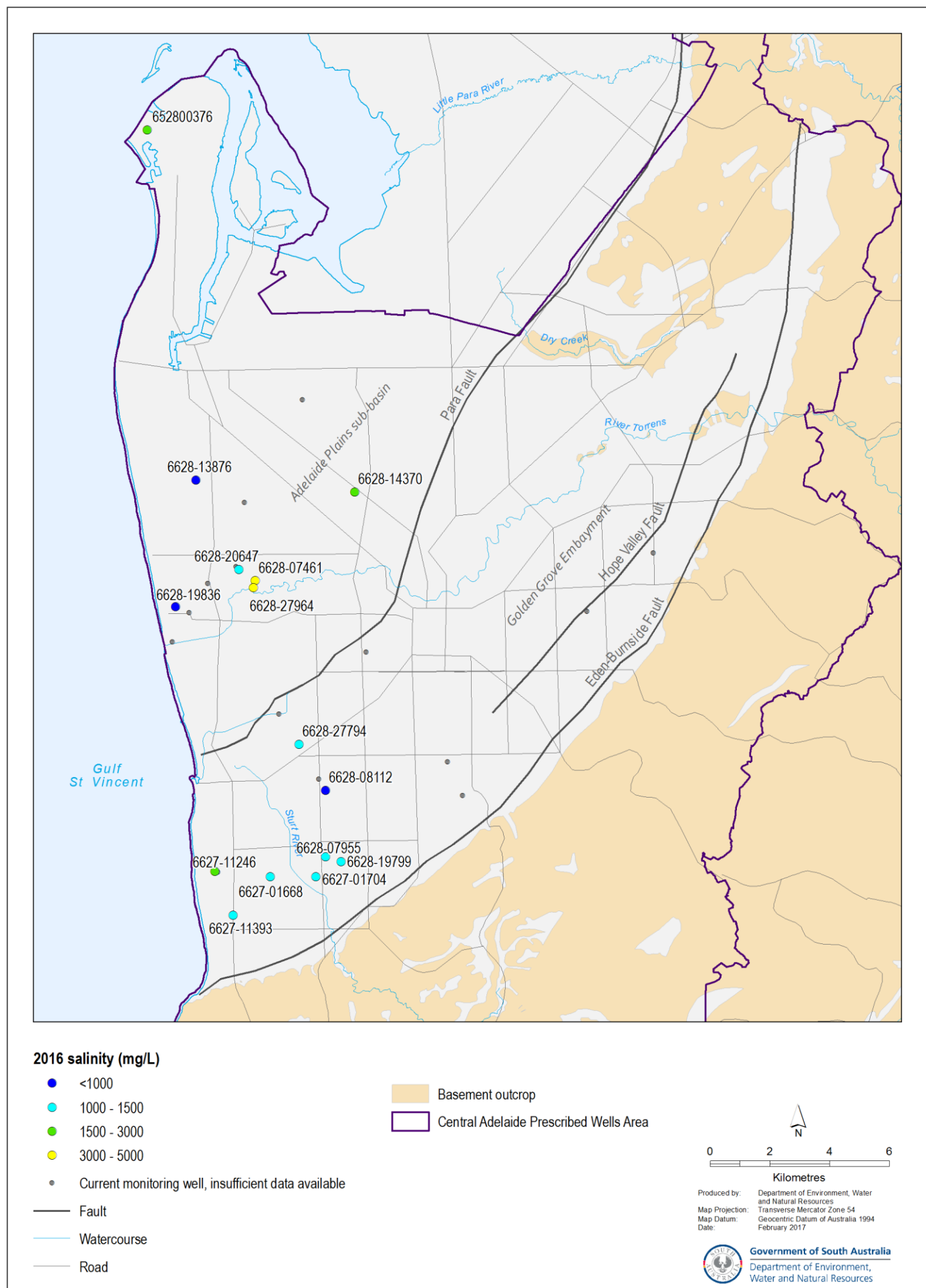


Figure 5. 2016 groundwater salinities of the T1 aquifer (Central Adelaide PWA)



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