Central Adelaide PWA

T1 aquifer

2015 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	

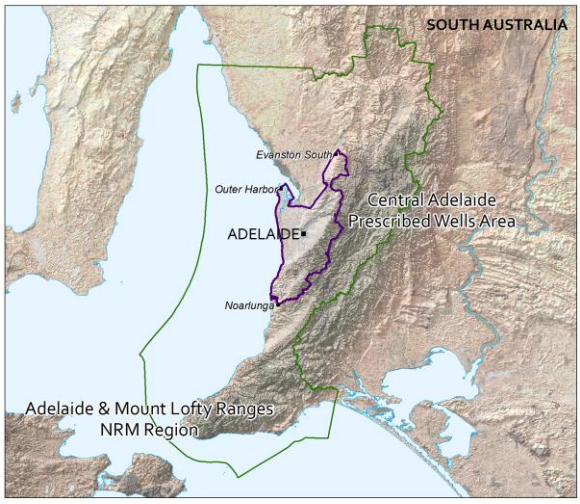
ISBN 978-1-925369-74-8

Preferred way to cite this publication

DEWNR, 2016, *Central Adelaide PWA T1 aquifer 2015 Groundwater level and salinity status report,* Government of South Australia, through the Department of Environment, Water and Natural Resources, Adelaide

Download this document at www.waterconnect.sa.gov.au

2015 Summary



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, within the Adelaide and Mount Lofty Ranges NRM 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 Tertiary-aged sedimentary aquifer, and this aquifer is the focus of this report. Due to the limited extractions from other aquifers in the PWA, they are not reported on.

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 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, 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 incident 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, with resultant rises in groundwater pressure levels and reductions in salinities.

There is a strong gradient in long-term average annual rainfall across the Central Adelaide PWA, ranging from 450 mm at Seaton (BoM Station 23024) near the coast, to 520 mm in North Adelaide (BoM Station 23011) and 930 mm at Cherry Gardens (BoM Station 23709) in the Adelaide Hills. The North Adelaide rainfall station recorded 343 mm of rainfall in the 2014–15 water-use year, the lowest on record for the last 80 years. This is 198 mm less than long-term average annual rainfall of 541 mm and 135 mm less than 5-year average of 478 mm (Figs. 1 and 2).

Although the Central Adelaide PWA is prescribed, licences have not yet been issued and there is currently no comprehensive 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 about 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.

The groundwater pressure level fluctuation in the T1 aquifer can be divided into two groups: summer irrigation extraction and year-round industrial extraction. Summer irrigation extraction causes major seasonal fluctuation, with declines in groundwater pressure level during summer and the recovery of levels in winter. However, significant increases in drawdown are not expected in the future because there is limited potential for an expansion of the irrigated areas (e.g. golf courses and school ovals). 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 drawdown. For example, this has occurred near Osborne, Thebarton and Regency Park.

Most monitoring wells (72%) show a trend of rising or stable groundwater pressure levels over the past five years (Fig. 4). Rises ranged between 0.03 and 2.05 m/y. The monitoring well that recorded the largest rise (ADE085) is located at Thebarton, where

intensive industrial extraction occurred. Pumping from this well no longer occurs, hence the large recovery in groundwater pressure level. The remaining 28% of wells show a trend of declining groundwater pressure levels ranging from 0.03 m/y, up to 0.87 m/y, with a median of 0.12 m/y. These wells are mainly located near the coast between West Beach and Seacliff, and the eastern side of the Hope Valley Fault (Fig. 4).

Large gaps in monitoring data make the assessment of long-term salinity trends within the Central Adelaide PWA difficult. Recent data indicate salinity is increasing in most monitoring wells, but is stable or decreasing in others. In 2015, T1 salinity ranged from 815 to 4164 mg/L and five out of 18 monitored wells have 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 a result, salinity has not been considered in the assessment of the status for the T1 aquifer.

To determine the status of the T1 aquifer for 2015, the trends in groundwater pressure levels 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.

The T1 aquifer of the Central Adelaide Prescribed Wells Area has been assigned a green status for 2015:

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

The 2015 status for the T1 aquifer is based on:

- most monitoring wells (72%) recorded a five-year trend of rising or stable groundwater levels.

It should be noted that despite the overall rising trend shown in most wells, a 'hot spot' between West Beach and Seacliff has been identified where the groundwater pressure level is declining, and one well reached its all time low in 2015.

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.

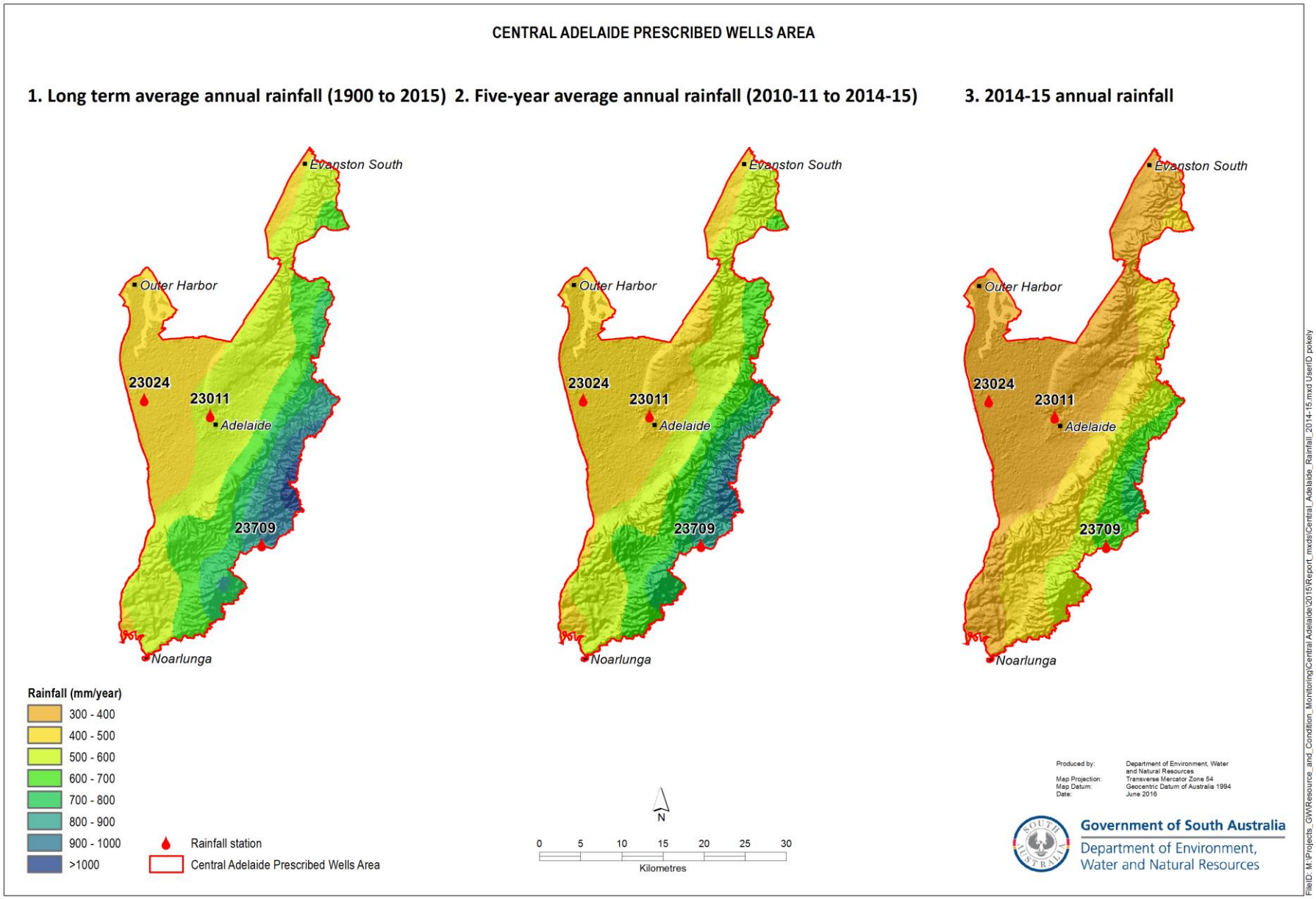


Figure 1. (1) Long-term and (2) five-year average annual rainfall and (3) annual rainfall for the 2014–15 water-use year in the Central Adelaide Prescribed Wells Area[1]

[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.

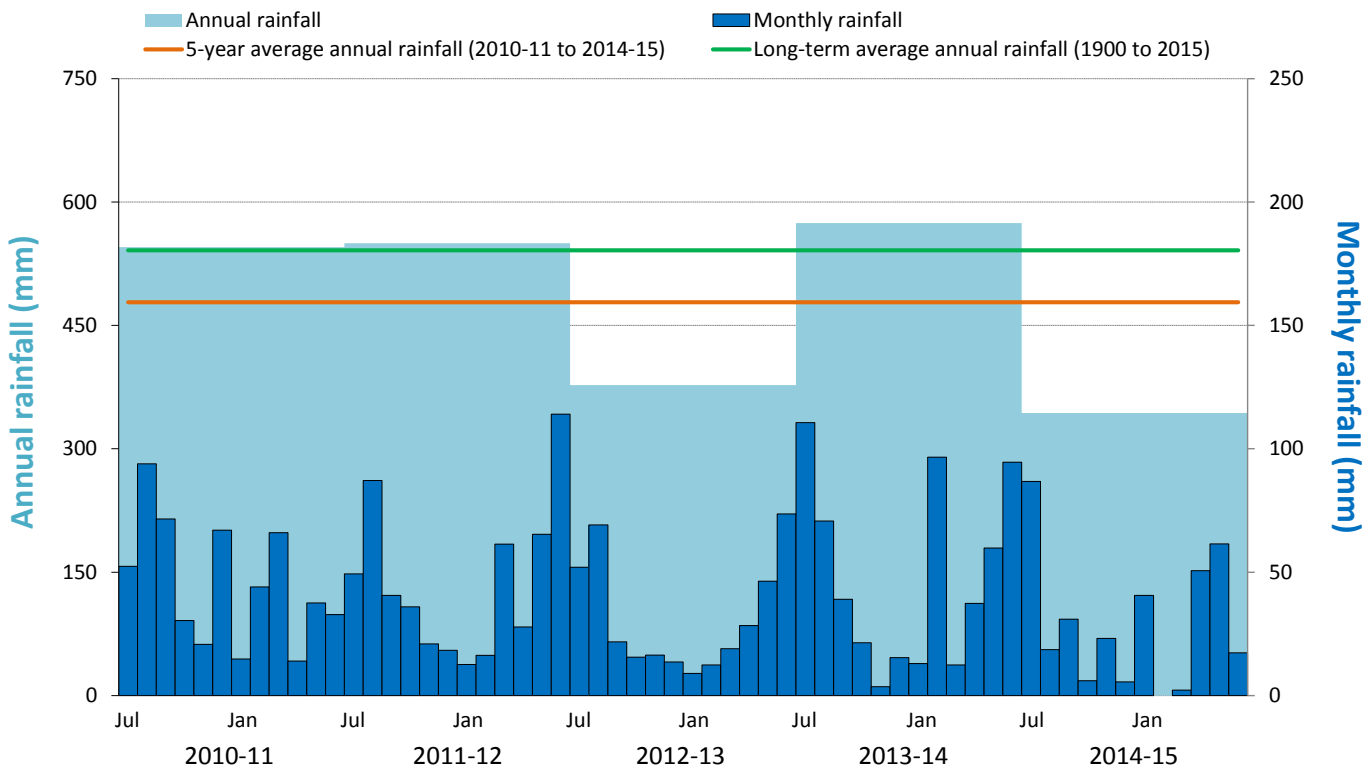


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-yearly and long-term average annual rainfall recorded at North Adelaide (BoM Station 23011)[2]

[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.

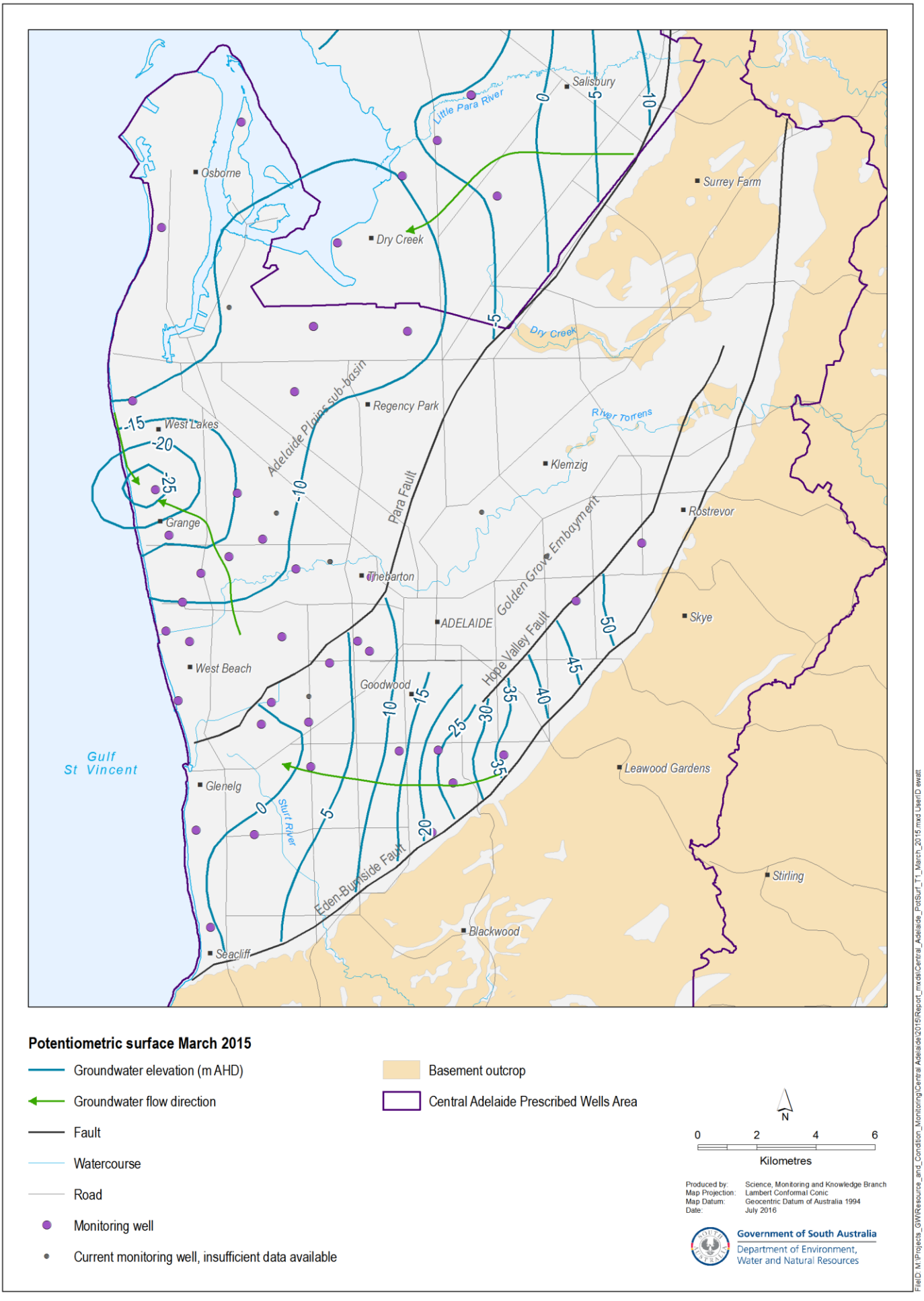


Figure 3. Potentiometric surface and direction of groundwater flow in the T1 aquifer (Central Adelaide Prescribed Wells Area) in March 2015

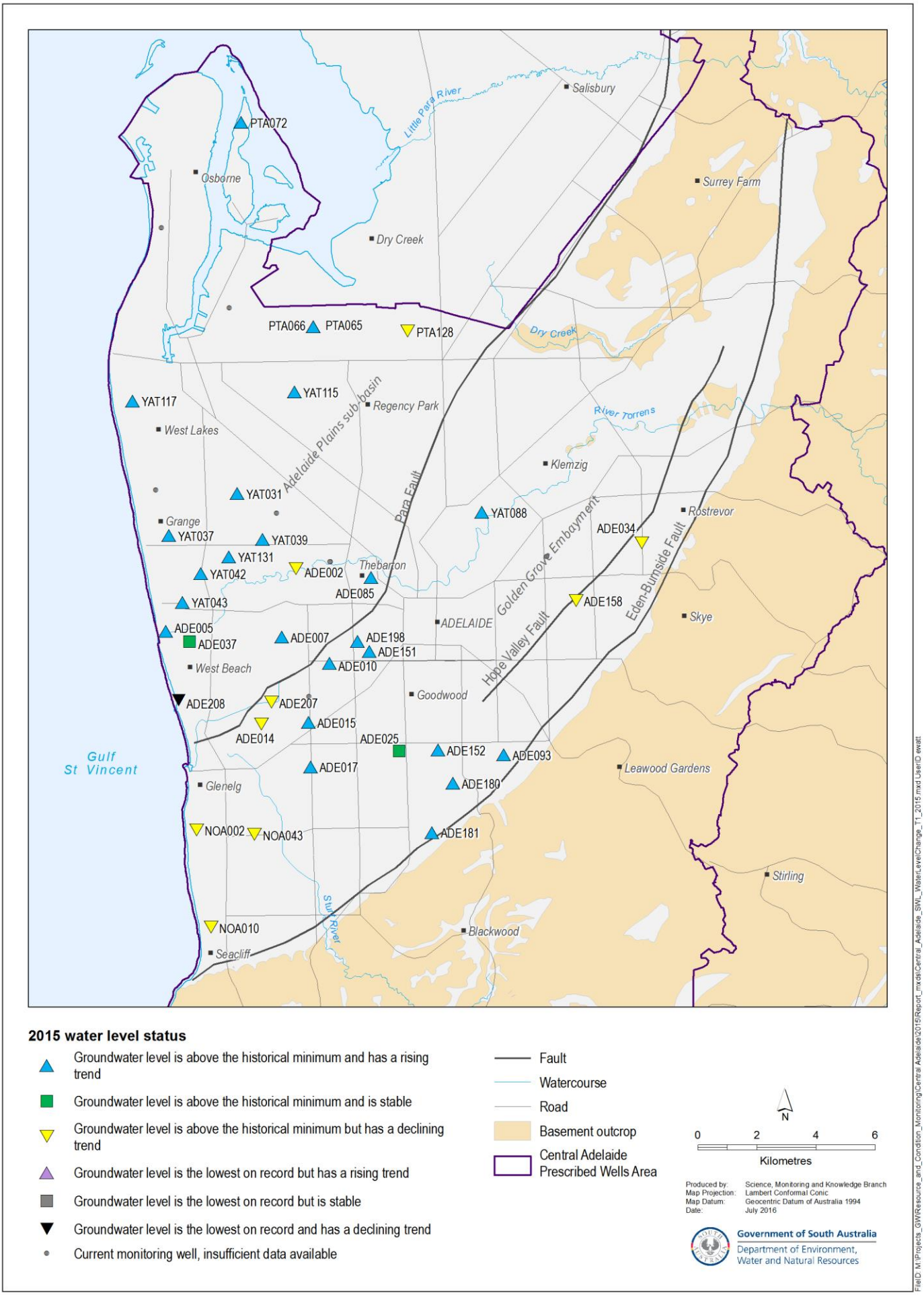


Figure 4. 2015 status of groundwater levels in the T1 aquifer (Central Adelaide Prescribed Wells Area) based on the 5-year trend from 2011 to 2015

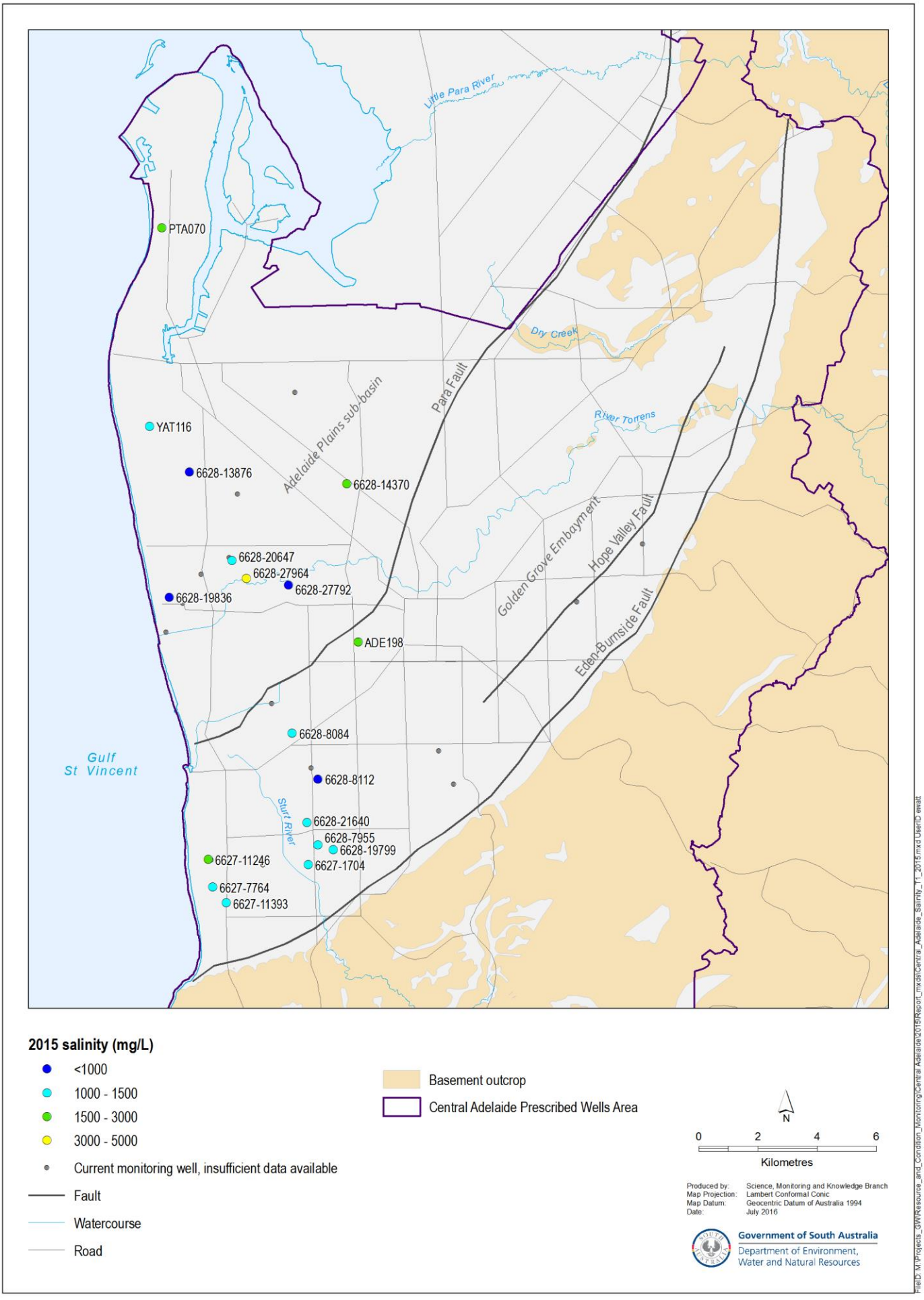


Figure 5. 2015 groundwater salinities of the T1 aquifer (Central Adelaide Prescribed Wells Area)

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