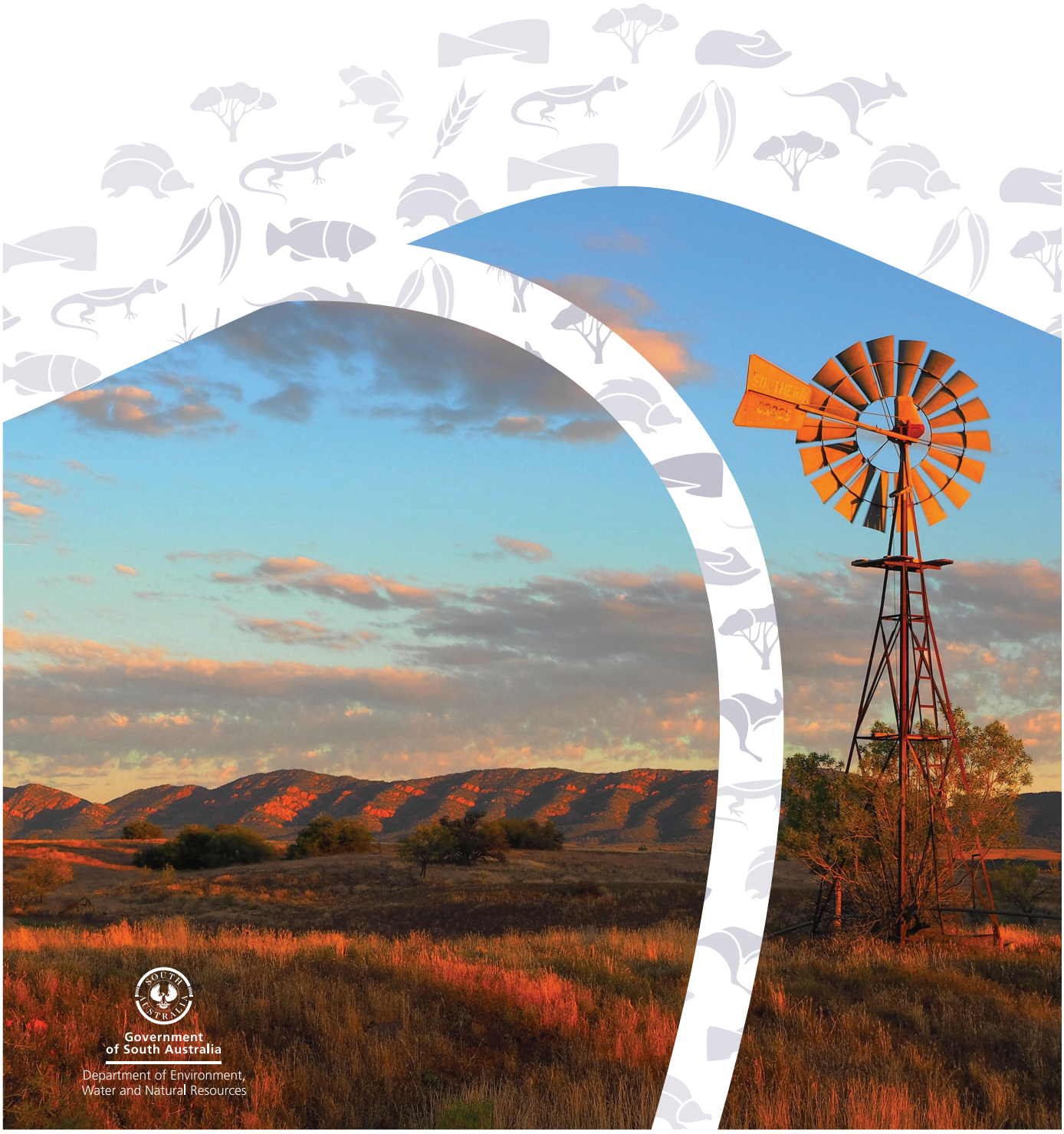
Northern Adelaide Plains PWA T2 aquifer

2016 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	

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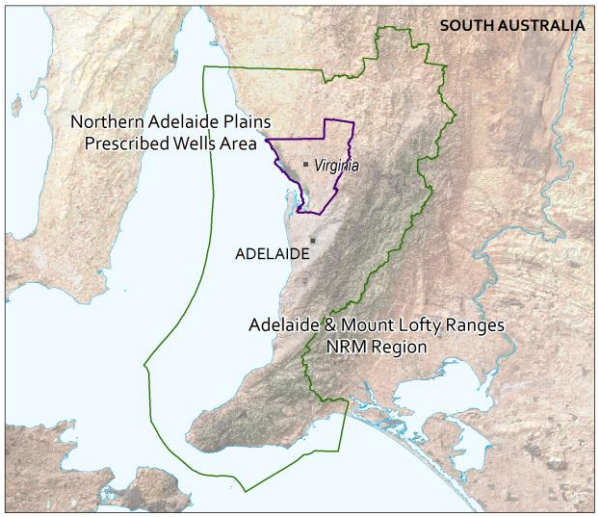
Regional setting



The Northern Adelaide Plains (NAP) Prescribed Wells Area (PWA) is located immediately north of the Adelaide metropolitan area, in the Adelaide and Mount Lofty Ranges Natural Resource Management Region. It is prescribed under South Australia's *Natural Resources Management Act 2004* and a water allocation plan provides for the sustainable use of the groundwater resources.

Within the NAP PWA, the two shallowest Tertiary aquifers (the T1 and T2 aquifers) are the main sources of groundwater, which is used mostly by the horticulture industry. The deeper T2 aquifer, which is separated from the T1 aquifer by the Munno Para Clay aquitard (i.e. confining layer), is the focus of this report. It occurs ubiquitously across the NAP PWA and consists of well-cemented limestones of the lower Port Willunga Formation.

The main source of recharge to the aquifer is thought to be lateral throughflow from the Mount Lofty Ranges, which lie to the east of the NAP PWA. Rainfall recharge to the fractured rock aquifers in the ranges flows towards the coast and likely recharges the sedimentary aquifers beneath the Adelaide plains by lateral flow across the Eden–Burnside and Para Faults.

Although there is no direct recharge from incident rainfall to the confined T2 aquifer, there may be an indirect correlation between groundwater pressure levels and rainfall, as periods of below-average rainfall will likely result in increased rates of groundwater extraction, which may lead to declines in groundwater pressure levels. Conversely, groundwater pressure levels may rise after periods of above-average rainfall due to reduced rates of groundwater extraction.

2016 Status

The T2 aquifer of the Northern Adelaide Plains PWA 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 T2 aquifer is based on:

- most monitoring wells (68%) show a five-year trend of rising groundwater pressure levels or levels are stable
- most monitoring wells (86%) show a five-year trend of decreasing or stable salinities.

Rainfall

The Smithfield rainfall station (BoM Station 23025) was selected as representative of rainfall throughout the NAP PWA and recorded 365 mm of rainfall in the 2015–16 water-use year (Fig. 1). This is 23% less than the long-term average of 475 mm (1900–2016), 15% less than the five-year average annual rainfall of 429 mm (2011–16) and 20% more than the previous year rainfall of 305 mm (Figs 1 and 2). A trend of declining rainfall is evident over the past five years (Fig. 1). Monthly rainfall data in 2015–16 show January, March and May recording above-average rainfall, but the remaining months recording totals below their long-term average (by a median 13 mm/month).

Water use

Groundwater extraction within NAP PWA occurs primarily from the T2 aquifer. In 2015–16, metered groundwater extractions totalled 9517 ML[1], which is a 12% increase from the previous water-use year of 8504 ML and 5% more than the five-year average annual extraction of 9033 ML (Fig. 3). This volume of extraction equates to 36% of the 26 500 ML total allocation volume for all aquifers within the NAP PWA and is a departure from the negative correlation between rainfall and groundwater extraction observed in previous years (Figs 2 and 3).

Groundwater pressure levels

Extractions from the T2 aquifer have created a long-standing cone of depression centred on Virginia, where intensive irrigation occurs (Fig. 4).

In the five years to 2016, 66% of groundwater monitoring wells show a rising trend at rates in the range of 0.02 to 2.23 m/y (median of 0.43 m/y), while 2% of monitoring wells show stable pressure levels (Fig. 5). The remaining 32% of monitoring wells show falling trends at rates of between 0.02 and 0.75 m/y (median of 0.12 m/y), with two wells showing their lowest level on record in 2016. Most wells showing declining pressure levels are located toward the north-east corner of the PWA (Fig. 5).

Groundwater salinity

In 2016, salinities ranged between 211 and 9218 mg/L, with 79% of the 266 wells showing salinities of less than 1500 mg/L (Fig. 6). Low-salinity wells are primarily located around the Virginia area and along the Gawler River, with salinities generally higher north of the Gawler River and to the east of Virginia.

In the five years to 2016, 76% of wells showed stable salinities, while 10% of wells shown a trend of decreasing salinity (Fig. 7). The remaining 14% of monitoring wells show a trend of increasing salinity.

[1] The licensed groundwater extraction volume for the 2015–16 water-use year is based on the best data available as of February 2017 and may be subject to change, as some extraction volumes are in the process of being verified.

More information

To determine the status of the T2 aquifer for 2016, the trends in groundwater pressure level and salinity 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 *Northern Adelaide Plains PWA groundwater level and salinity status report 2009–10*, 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 monitoring wells within the Northern Adelaide Plains PWA, please visit Groundwater Data on WaterConnect.

For further details about the Northern Adelaide Plains PWA, please see the *Adelaide Plains Water Allocation Plan* on the Natural Resources Adelaide and Mt Lofty Ranges website.

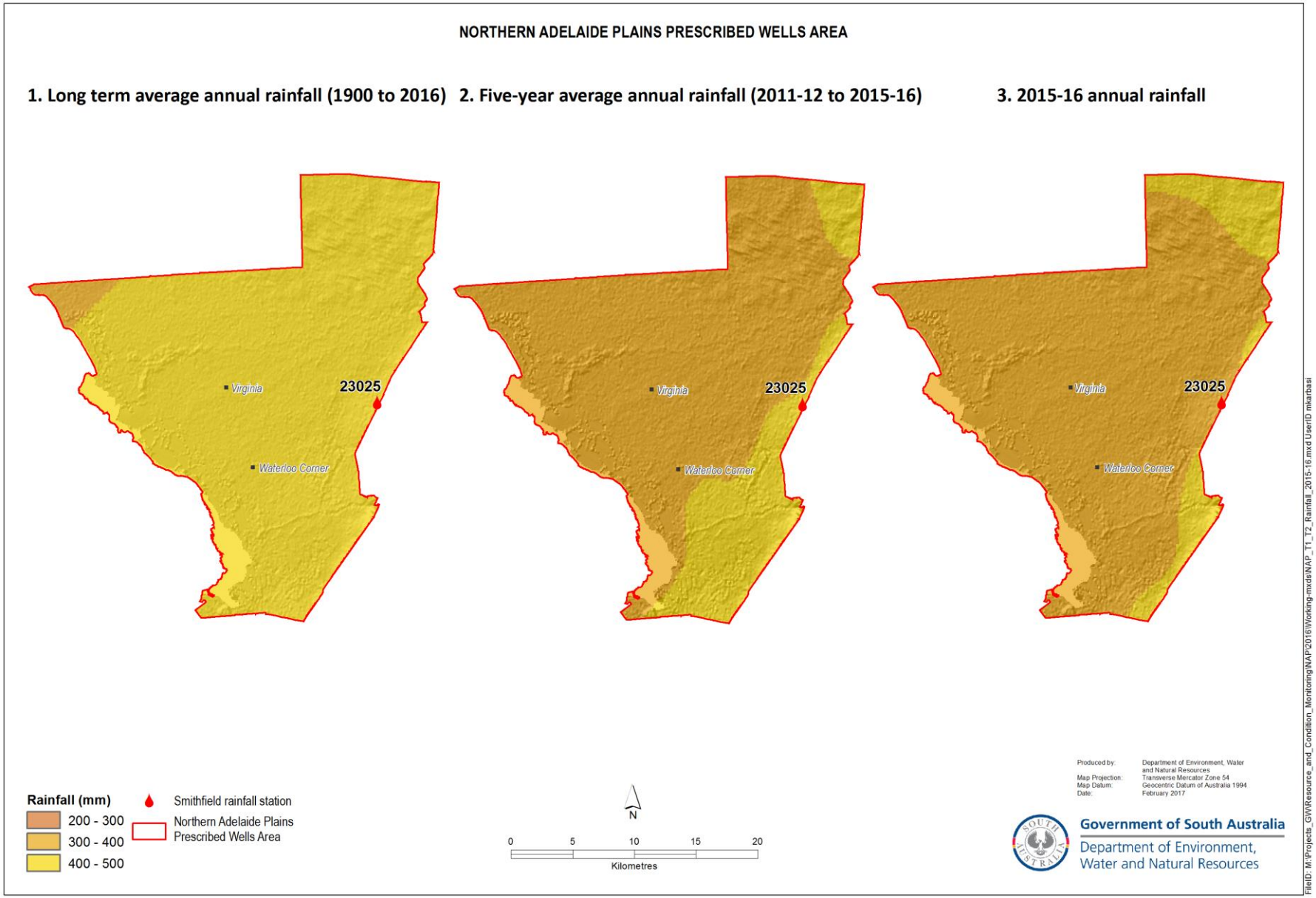


Figure 1. (1) Long-term and (2) five-year average annual rainfall and (3) annual rainfall for the 2015–16 water-use year in the Northern Adelaide Plains PWA[2]

[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.

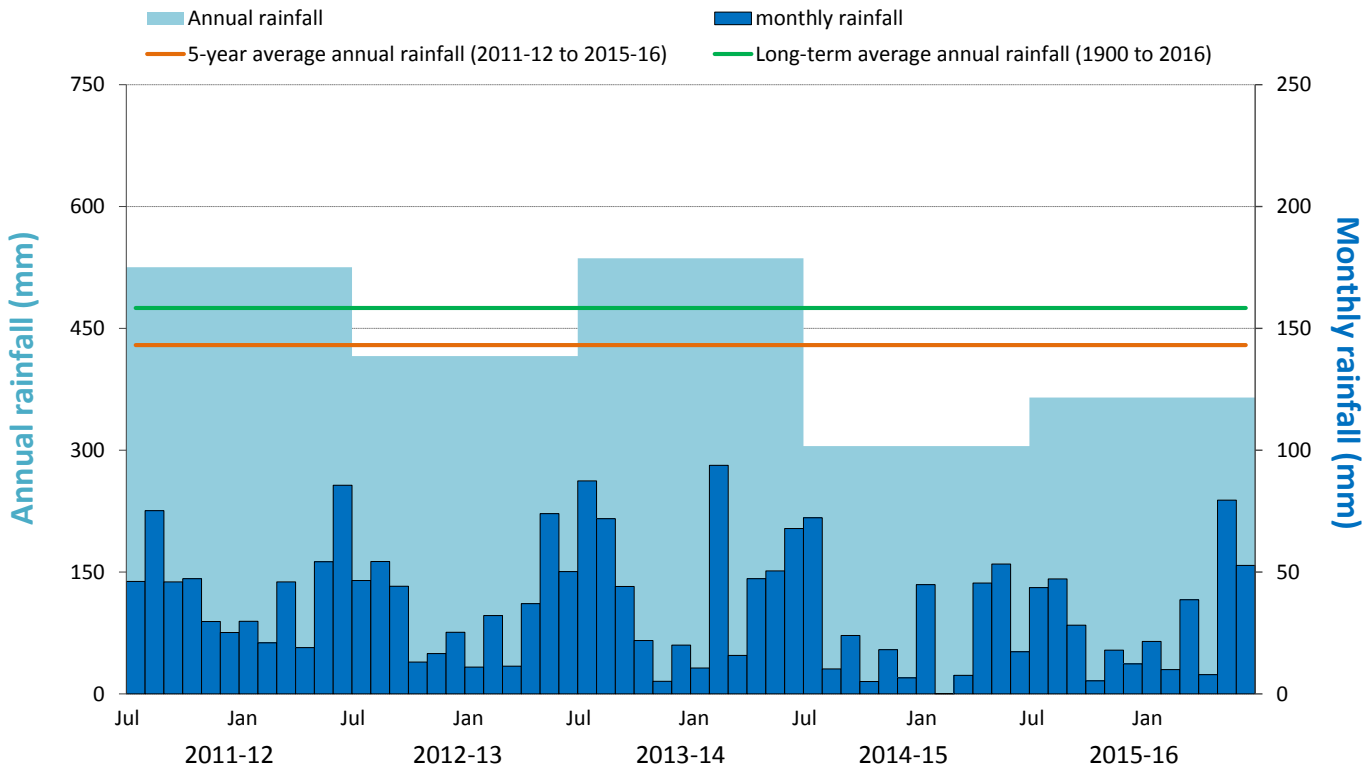


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Smithfield (BoM Station 23025)[3]

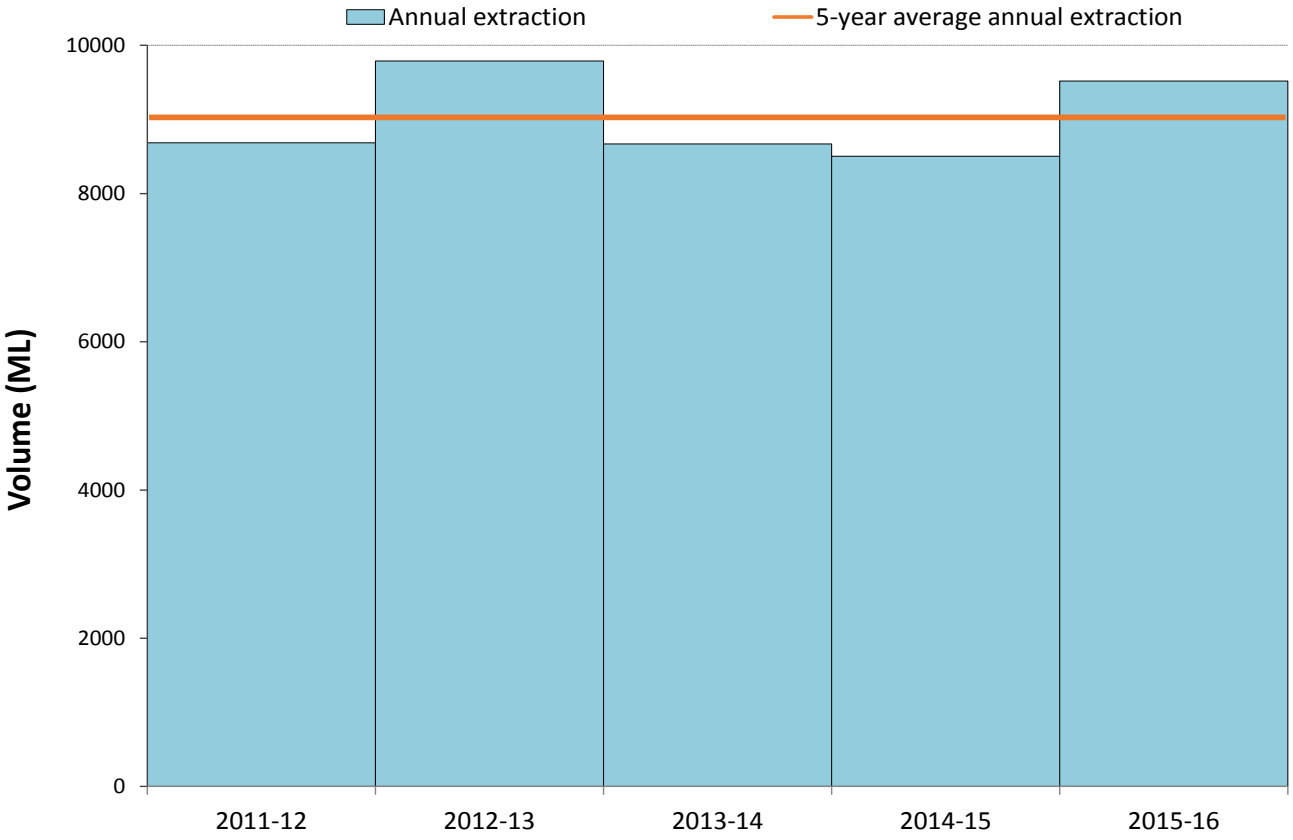


Figure 3. Licensed groundwater extraction volumes[4] for the past five water-use years, for the T2 aquifer of the Northern Adelaide Plains PWA

[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.

[4] The licensed groundwater extraction volume for the 2015–16 water-use year is based on the best data available as of January 2017 and may be subject to change, as some extraction volumes are in the process of being verified.

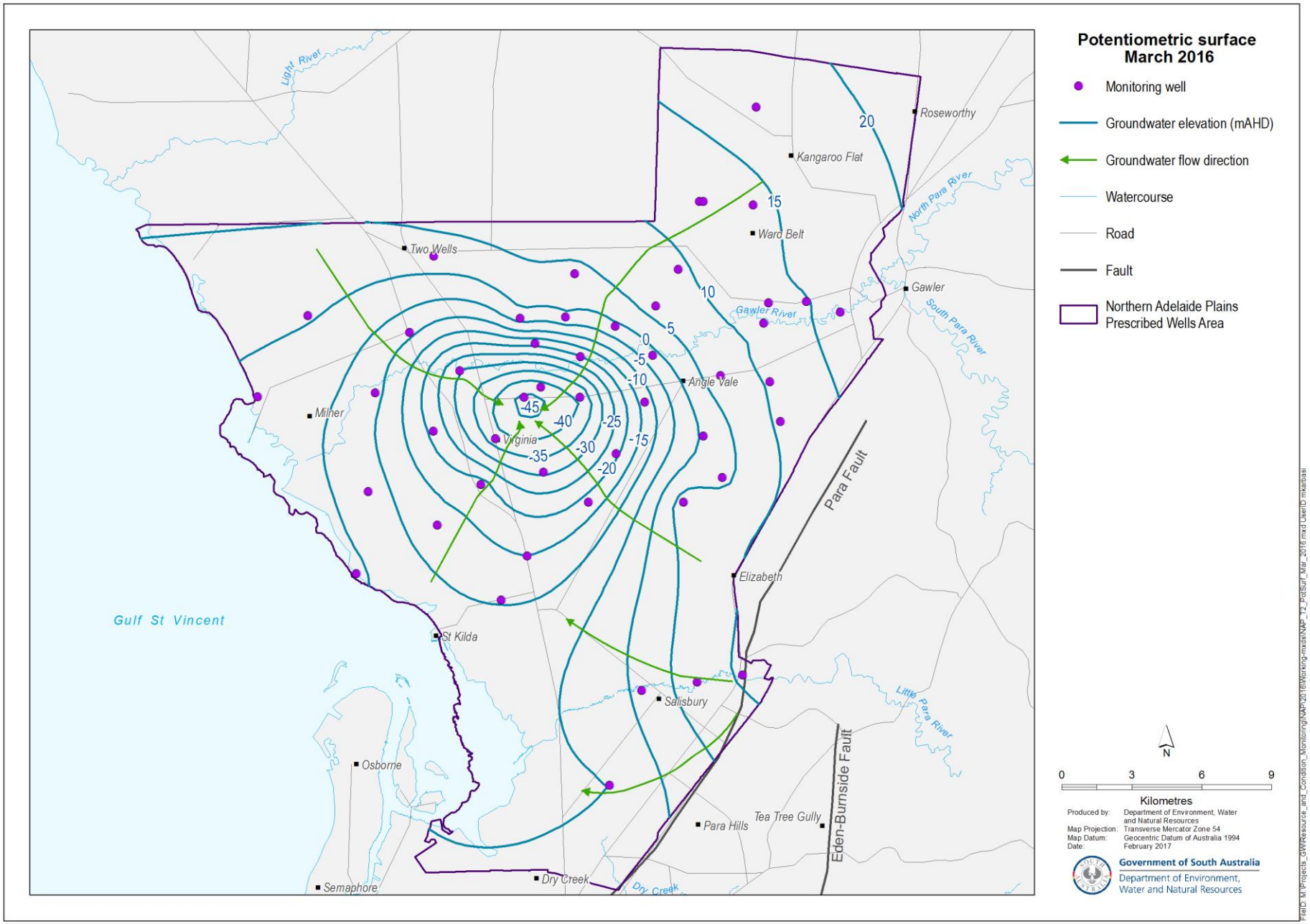


Figure 4. Potentiometric surface and direction of groundwater flow in the T2 aquifer (Northern Adelaide Plains PWA) in March 2016

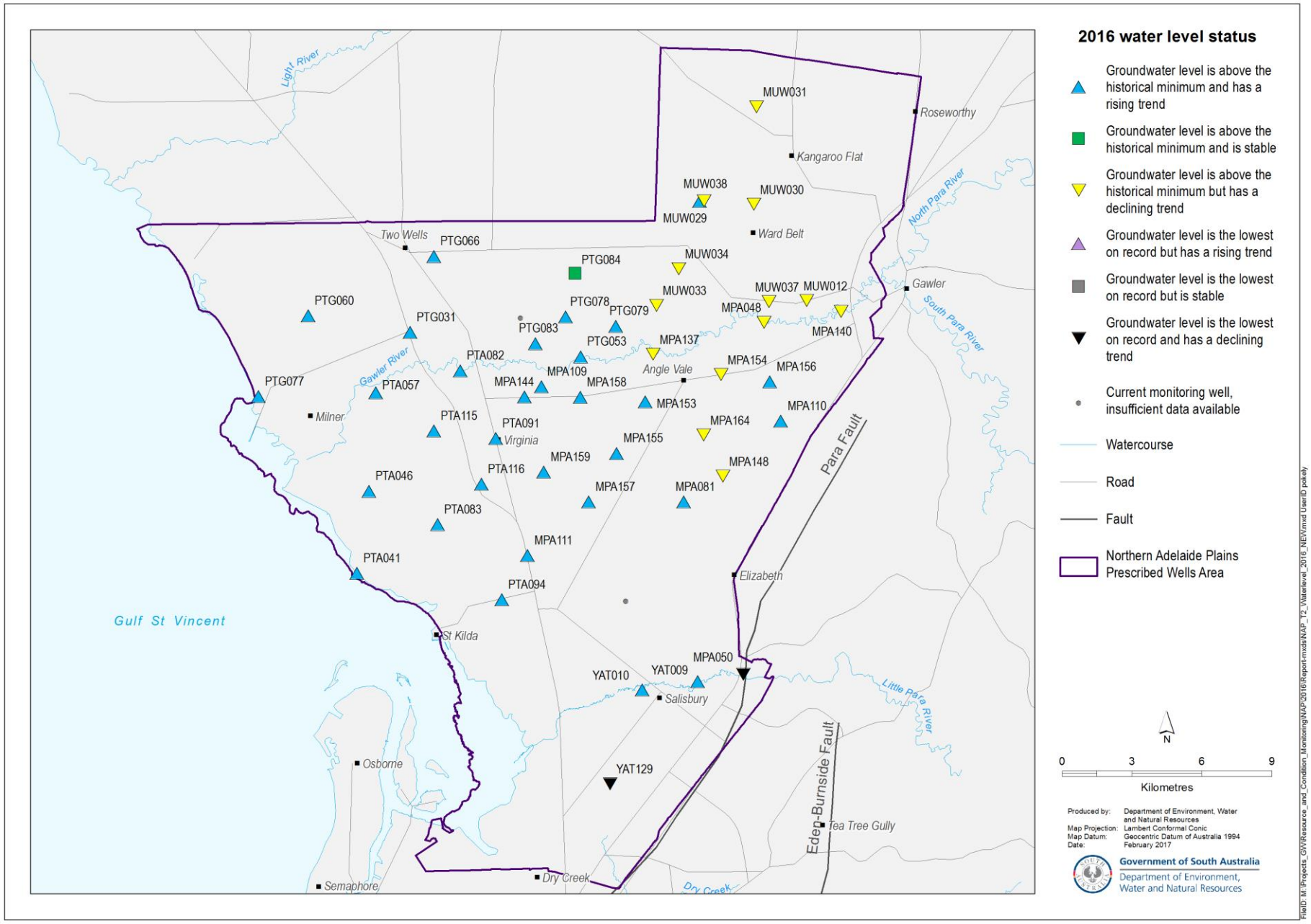


Figure 5. 2016 status of the groundwater pressure levels in the T2 aquifer (Northern Adelaide Plains PWA) based on 5-year trends from 2012 to 2016

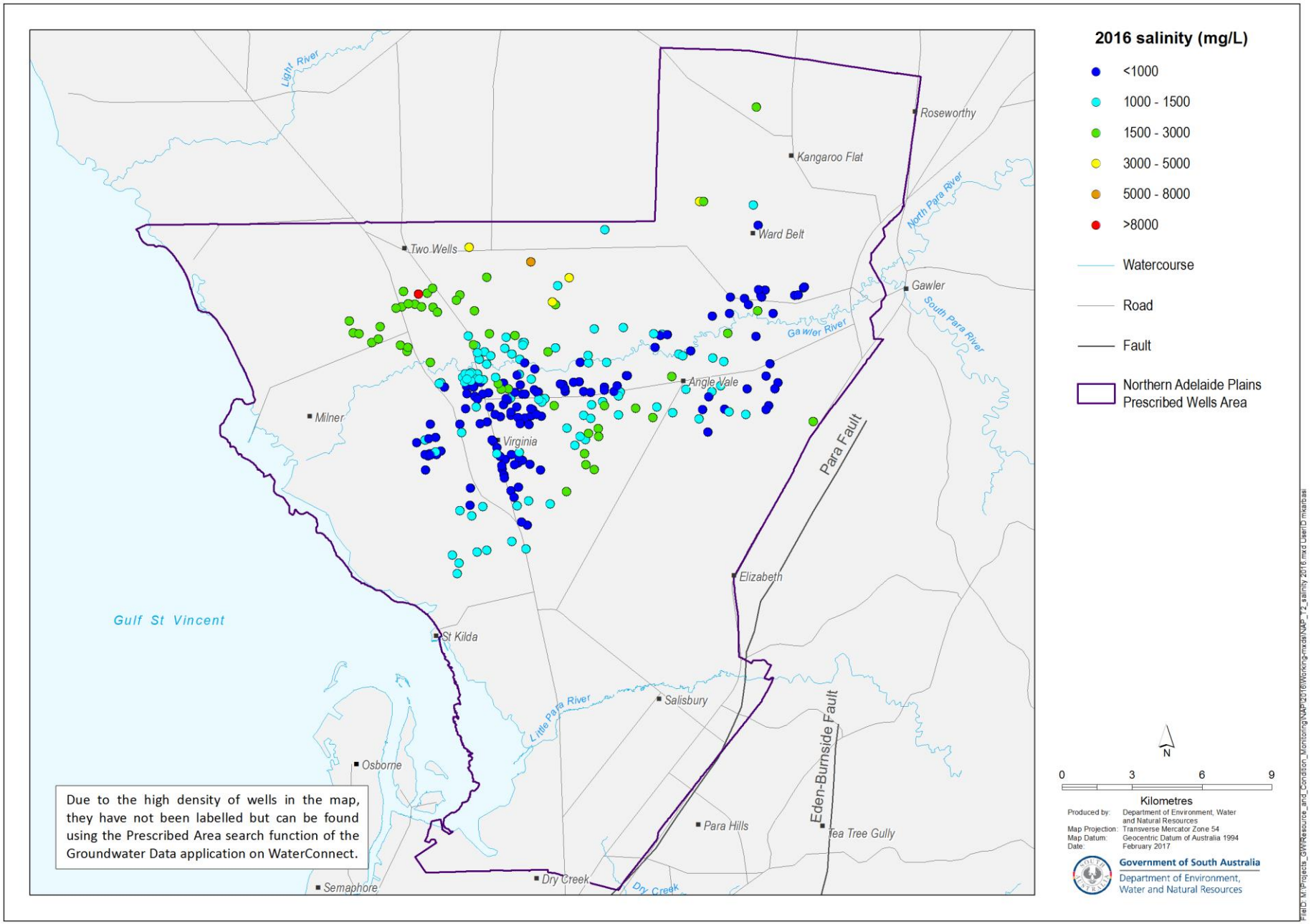


Figure 6. 2016 groundwater salinities of the T2 aquifer (Northern Adelaide Plains PWA)

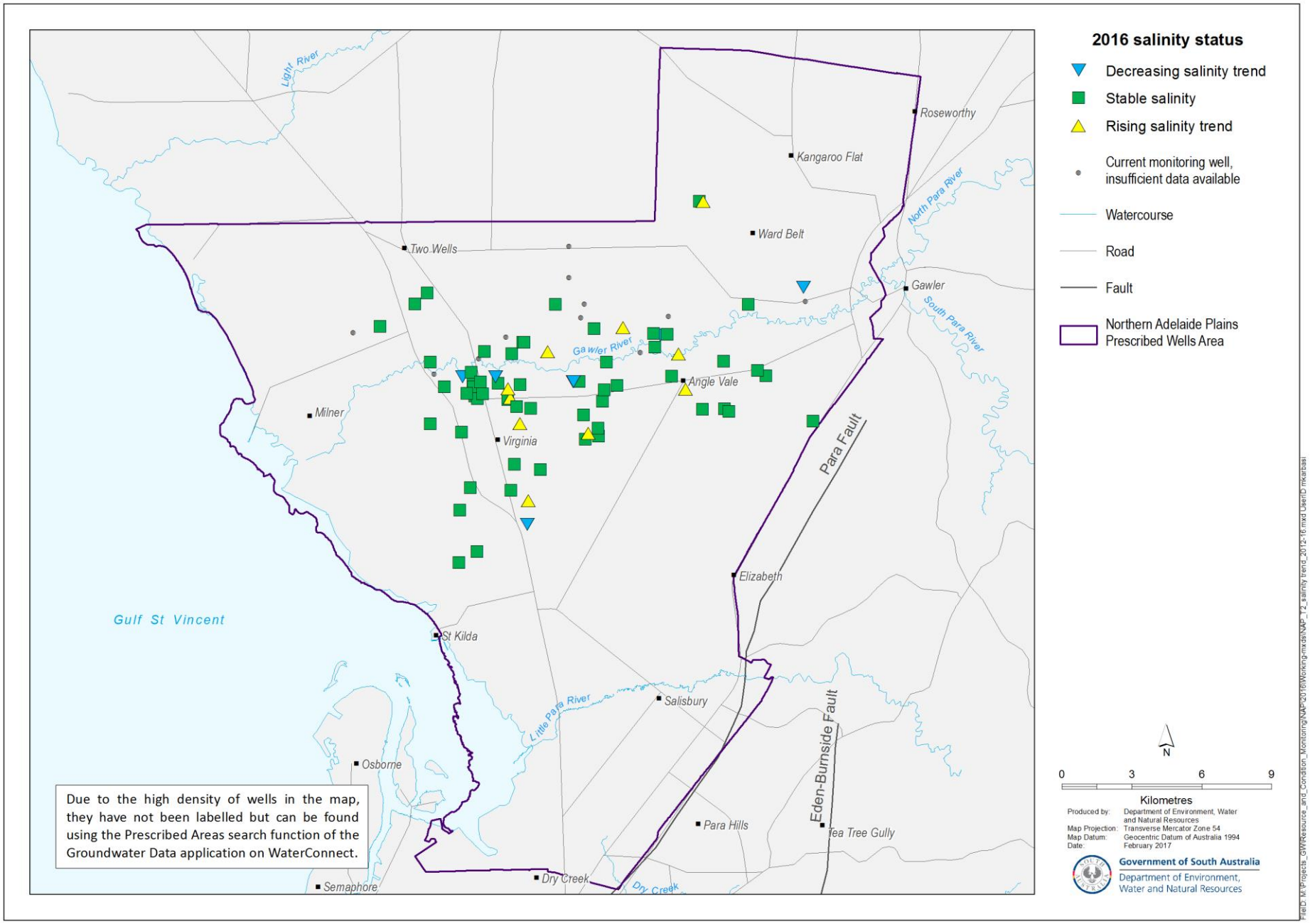


Figure 7. 2016 status of the groundwater salinities in the T2 aquifer (Northern Adelaide Plains PWA) based on 5-year trends from 2012 to 16

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