

Tatiara PWA

Unconfined aquifer

2016 Groundwater level and salinity status report



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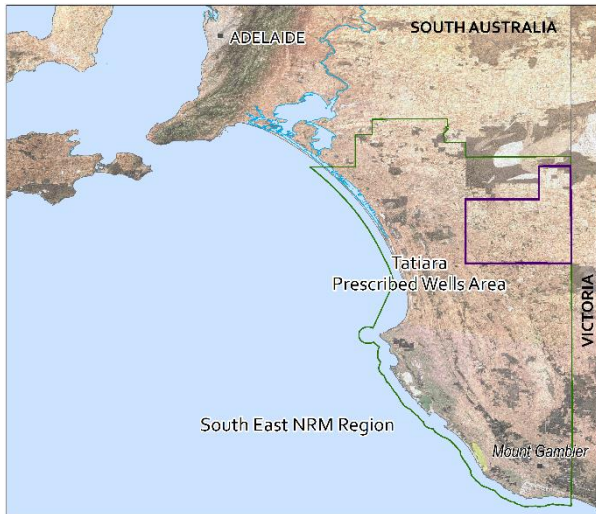
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Regional setting



The Tatiara Prescribed Wells Area (PWA) is located in the South East Natural Resources Management (NRM) region of South Australia, approximately 200 km south-east of Adelaide. It is a regional-scale resource for which groundwater is prescribed under South Australia's *Natural Resources Management Act 2004*. A water allocation plan provides for the sustainable use of the groundwater resources.

The Tatiara PWA is underlain by sediments of the Murray Basin and can be divided topographically into two discrete landforms, each with different hydrogeological characteristics: low-lying plains to the west and highlands located to the east (Fig. 4). Both landforms are underlain by two groundwater systems – an unconfined aquifer comprising various Quaternary and Tertiary limestones, sands and sandstones, and an underlying confined Tertiary sand aquifer. The status of the confined groundwater resource is published in a separate report *Prescribed Wells*

Areas of the South East confined aquifer 2016 Groundwater level and salinity status report. Please visit the *Water Resource Assessments* page on [WaterConnect](#), for more information. The unconfined aquifer of the Tatiara PWA is the focus of this report.

The Quaternary-aged Padthaway, Coomandook and Bridgewater Formations form the unconfined aquifer on the plains. In the highlands, the Tertiary-aged Murray Group limestone forms the unconfined aquifer. The main sources of recharge to the unconfined aquifer are: direct infiltration of local rainfall; groundwater flow from east to west; and point-source recharge to sinkholes (otherwise known as runaway holes).

Trends in groundwater levels and salinity in the Tatiara PWA are primarily climate driven: below-average rainfall results in a reduction in recharge to the aquifers. Below-average summer rainfall can also result in increased irrigation extraction, and these two elements may cause groundwater levels to fall and salinity to increase. Conversely, increased rainfall may result in increased recharge, decreased irrigation extraction and a rise in groundwater levels, which may cause salinity to stabilise or decline.

Groundwater levels and salinities have also been affected by the clearance of native vegetation and subsequent land-use change and recycling of irrigation drainage water. The response of groundwater levels of the unconfined aquifer to rainfall varies between the plains and highlands primarily due to the depth to the watertable and lithology of the sediments (i.e. clay content). Groundwater levels are more responsive to rainfall on the low-lying plains where the watertable is shallow. In the ranges, where the watertable is greater than 10 m below ground surface, the watertable shows a delayed response with a lag time that is dependent on the depth to the watertable, land use and the permeability of the sediments.

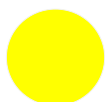
2016 Status

Due to the vast area, different land uses and geomorphology of the Tatiara PWA, the unconfined aquifer has been divided into two resource groups (Fig. 4), with a status assigned to each group.

Highlands

The unconfined aquifer of the highlands in the Tatiara PWA has been assigned a yellow status for 2016:

2016 Status



Minor adverse trends have been observed over the past five years

The 2016 status for the highlands is based on:

- almost half of monitoring wells (46%) show a five-year trend of falling groundwater levels, with 38% showing their lowest groundwater level on record in 2016.

Although a yellow status has been assigned to the highlands in the Tatiara PWA, it is acknowledged that all monitoring wells show a five-year trend of stable groundwater salinities.

Plains and low-lying areas of the highlands

The unconfined aquifer of the plains and low-lying areas of the Tatiara PWA has been assigned an orange status for 2016:

2016 Status



Moderate adverse trends have been observed over the past five years

The 2016 status for the plains and low-lying areas is based on:

- most monitoring wells (94%) show a five-year trend of declining groundwater levels, and 65% show their lowest groundwater level on record in 2016.

Despite the orange status assigned to the plains and low-lying areas, it is acknowledged that over the past five years most monitoring wells (86%) show stable groundwater salinities.

Rainfall

Keith rainfall station (BoM station 25507), which is located in the west of the Tatiara PWA, recorded 385 mm of rainfall in the 2015-16 water-use year. This is 76 mm lower than the long-term average annual rainfall of 461 mm (1900–2016), but 16 mm above the five-year average annual rainfall of 369 mm (Figs 1 and 2). Trends of declining contemporary rainfall are evident across the PWA when compared with the long term (Fig. 1). In the 2015–16 water-use year, monthly rainfall data show that January, February, March and November recorded above-average rainfall when compared with their respective long-term averages. Notably, March, October and December registered rainfall less than one-third their respective long-term monthly average rainfall (Fig. 2).

Water use

In 2015–16, licensed groundwater extractions (excluding stock and domestic use) totalled 95 107 ML¹ (Fig. 3), which represents a reduction of 6% from the previous water-use year. This volume is 98% of the total allocation volume for the Tatiara PWA. An increase in groundwater extraction can be seen over recent years (Fig. 3), most likely as a result of rainfall that has been below the long-term average.

Groundwater levels

For the five years to 2016, almost half of monitoring wells (46%) in the highlands (Shaugh, Cannawigara, Zone 8A and Tatiara Management Areas) show five-year trends of declining groundwater levels at rates ranging from 0.02 to 0.08 m/y, with a median of 0.06 m/y (Fig. 4). Of these wells, 38% show their lowest groundwater level on record in 2016. The remaining wells in this area show stable groundwater levels, with the exception of one well that shows a rising trend of 0.14 m/y.

In the five years to 2016, 49 wells (94%) that are located on the plains and low-lying areas of the highlands (Stirling, Willalooka, North Pendleton and Wirrega Management Areas) show a trend of falling groundwater levels. Rates of decline range between 0.01 and 0.27 m/y, with a median of 0.12 m/y. In 2016, 32 wells (65%) show their lowest groundwater level on record (Fig. 4). Rising trends in groundwater level are shown in two wells, at a median rate of 0.8 m/y.

Groundwater salinity

In 2016, groundwater salinities on the plains ranges from 930 mg/L in the Wirrega Management Area to 9015 mg/L in the Stirling Management Area, with a median of 2730 mg/L (Fig. 5).

In the five years to 2016, all monitoring wells in the highlands show stable groundwater salinity (Fig. 6).

In the five years to 2016, 86% of monitoring wells on the plains and low-lying areas show stable salinity (Fig. 6). Of the remaining wells, two wells show trends of increasing salinity with a median of 121 mg/L/y, while the other two wells show trend of decreasing salinity with a median of 432 mg/L/y. These four wells are concentrated in the central and north-western area of the plains and low-lying areas.

¹ The licensed groundwater use for the 2015–16 water-use year is based on the best data available as of April 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 unconfined aquifer of the Tatiara PWA for 2016, the trends in groundwater 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 *Tatiara 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 on [WaterConnect](#).

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

For further details about the Tatiara PWA, please see the *Water Allocation Plan for the Tatiara Prescribed Wells Area* on the Natural Resources South East [website](#).

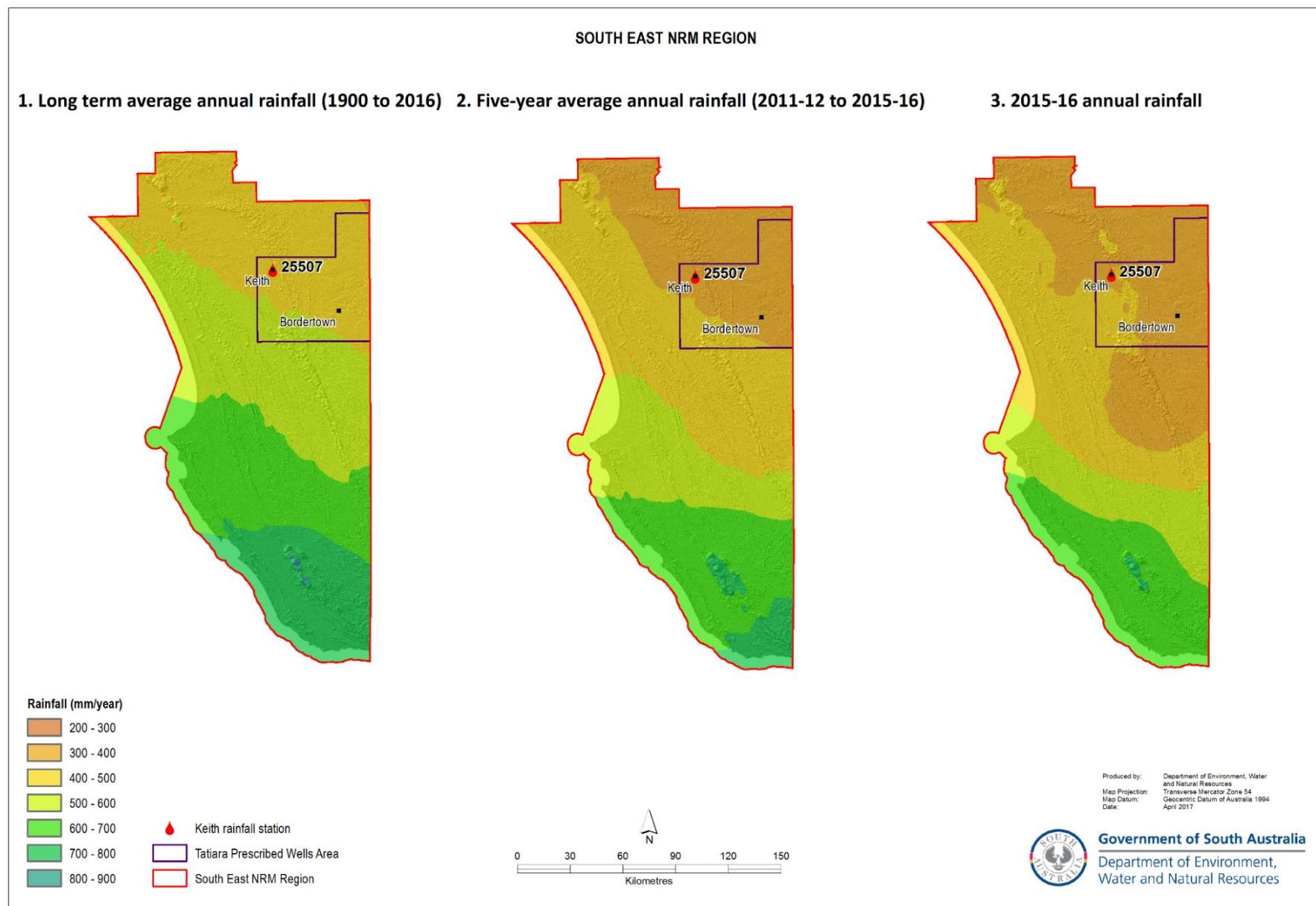


Figure 1. (1) Long-term and (2) five-year average annual rainfall, and (3) annual rainfall for the 2015–16 water-use year in the South East NRM Region²

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.

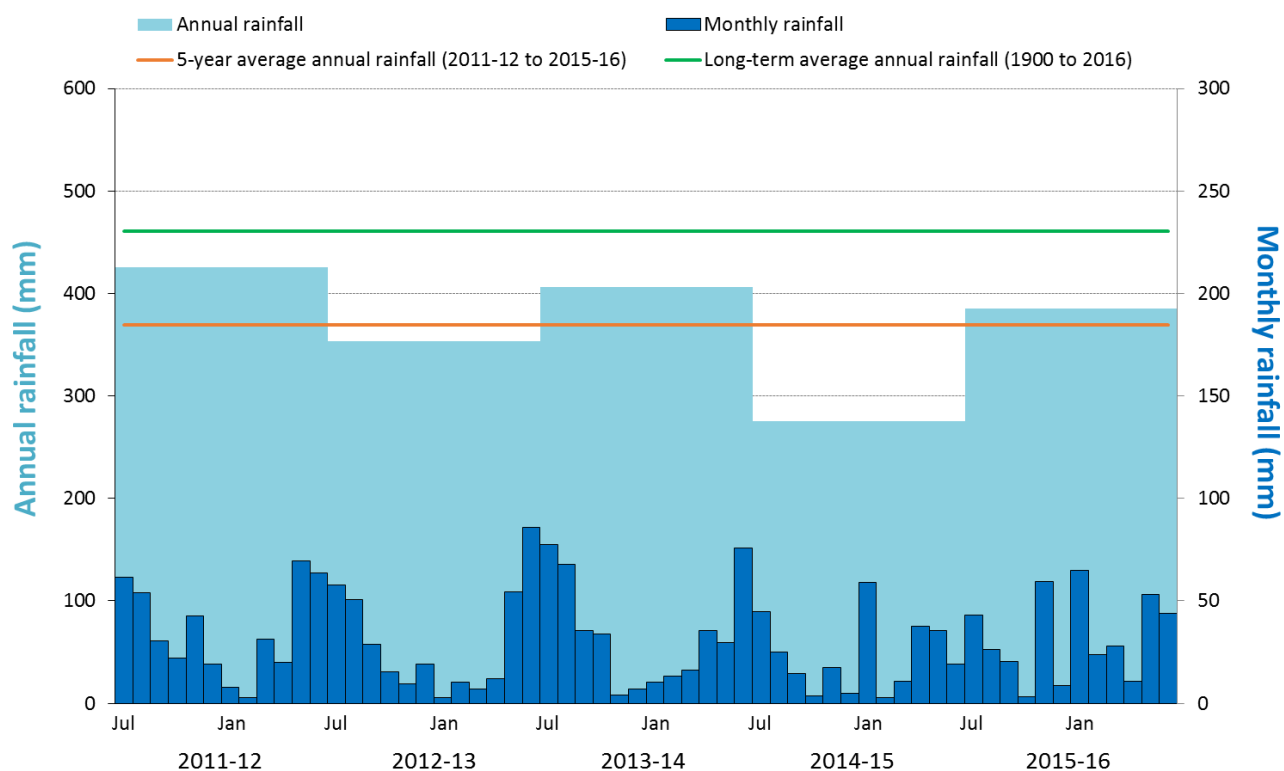


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Keith (BoM station 25507)³

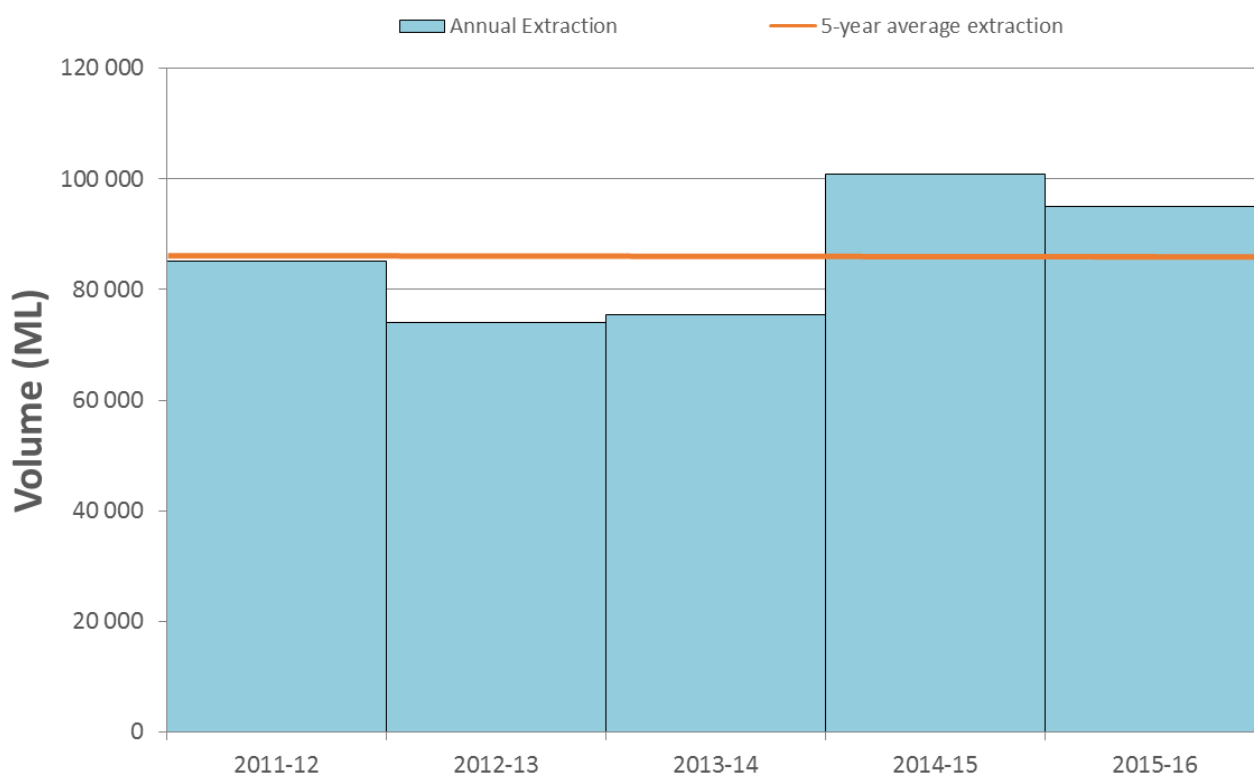
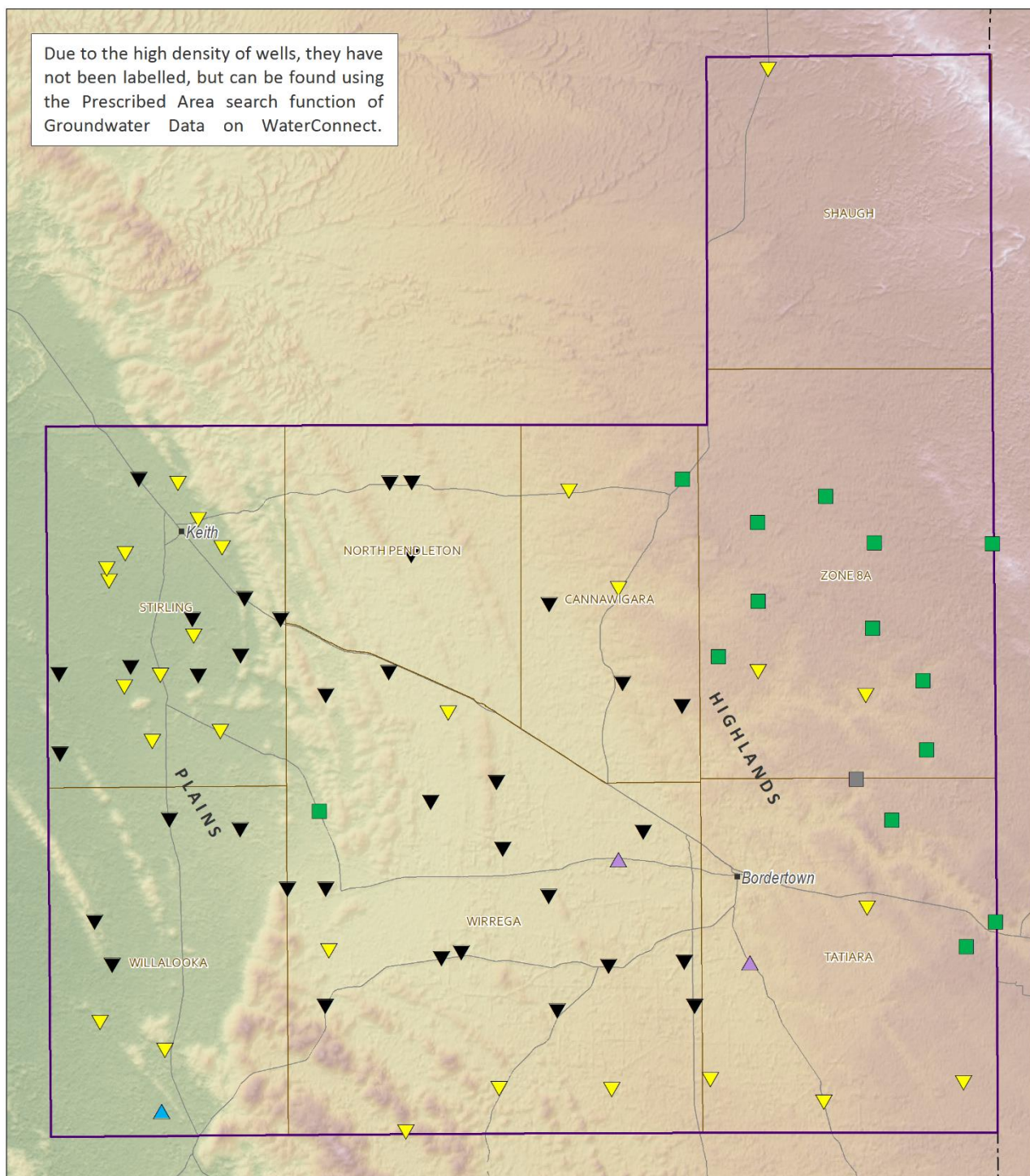


Figure 3. Licensed groundwater extraction volumes⁴ for the past five water-use years, from the unconfined aquifer (Tatiara PWA)

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 use for the 2015–16 water-use year is based on the best data available as of April 2017 and may be subject to change, as some extraction volumes are in the process of being verified.



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

— Road

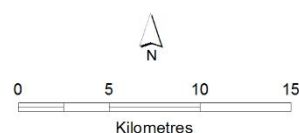
▭ Management Area

▭ Tatiara Prescribed Wells Area

Ground elevation (m AHD)

High : 175

Low : 17

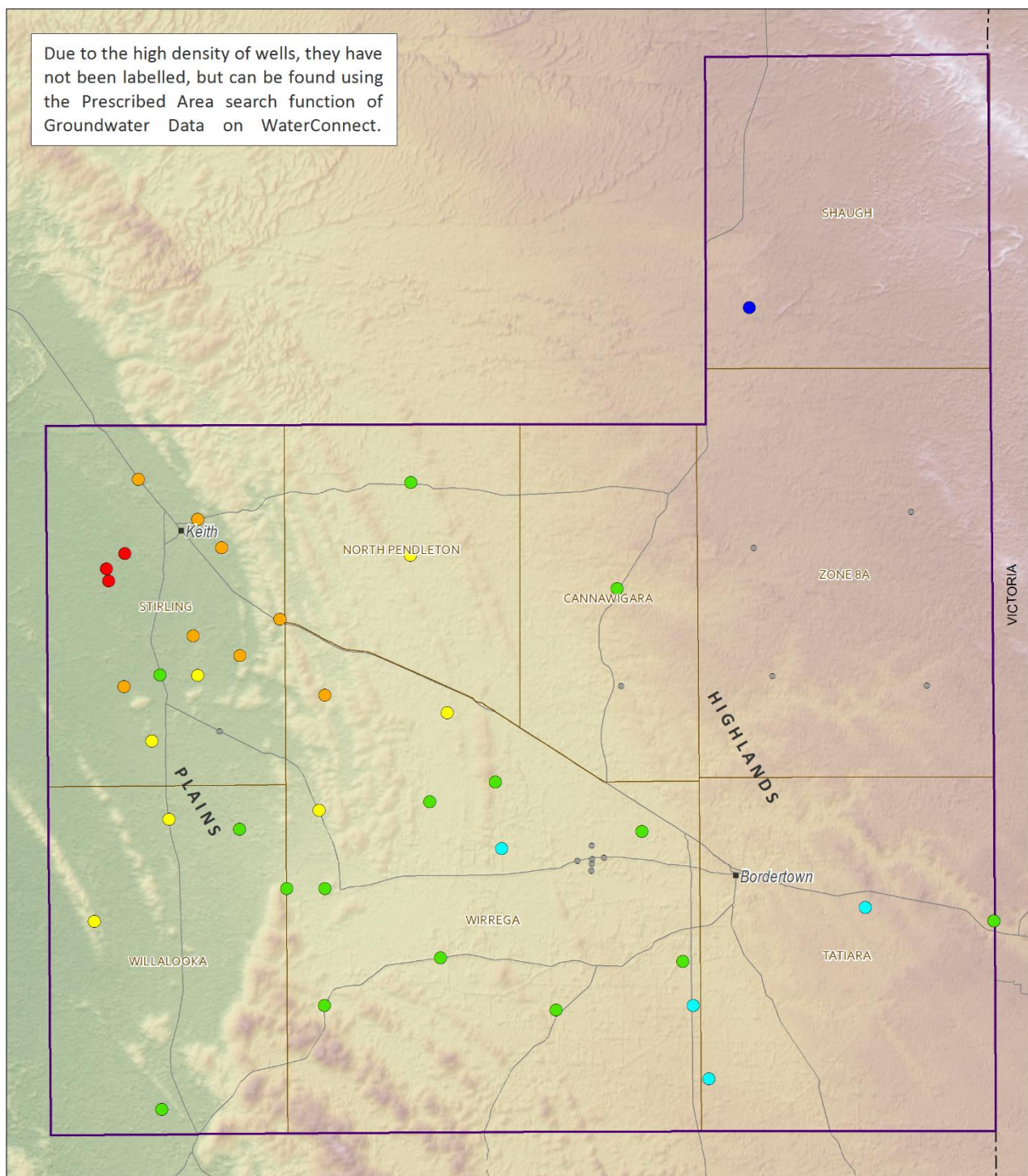


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Date: April 2017



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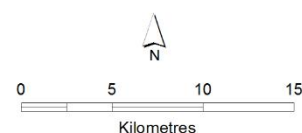
Figure 4. 2016 status of groundwater levels in the unconfined aquifer (Tatiara PWA), based on five-year trend from 2012 to 2016



2016 Salinity (mg/L)

- < 1000
- 1000 - 1500
- 1500 - 3000
- 3000 - 5000
- 5000 - 8000
- > 8000

- Current monitoring well, insufficient data available
- Road
- Management Area
- Tatiara Prescribed Wells Area
- Ground elevation (m AHD)
 - High : 175
 - Low : 17



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Figure 5. 2016 groundwater salinity of the unconfined aquifer (Tatiara PWA)

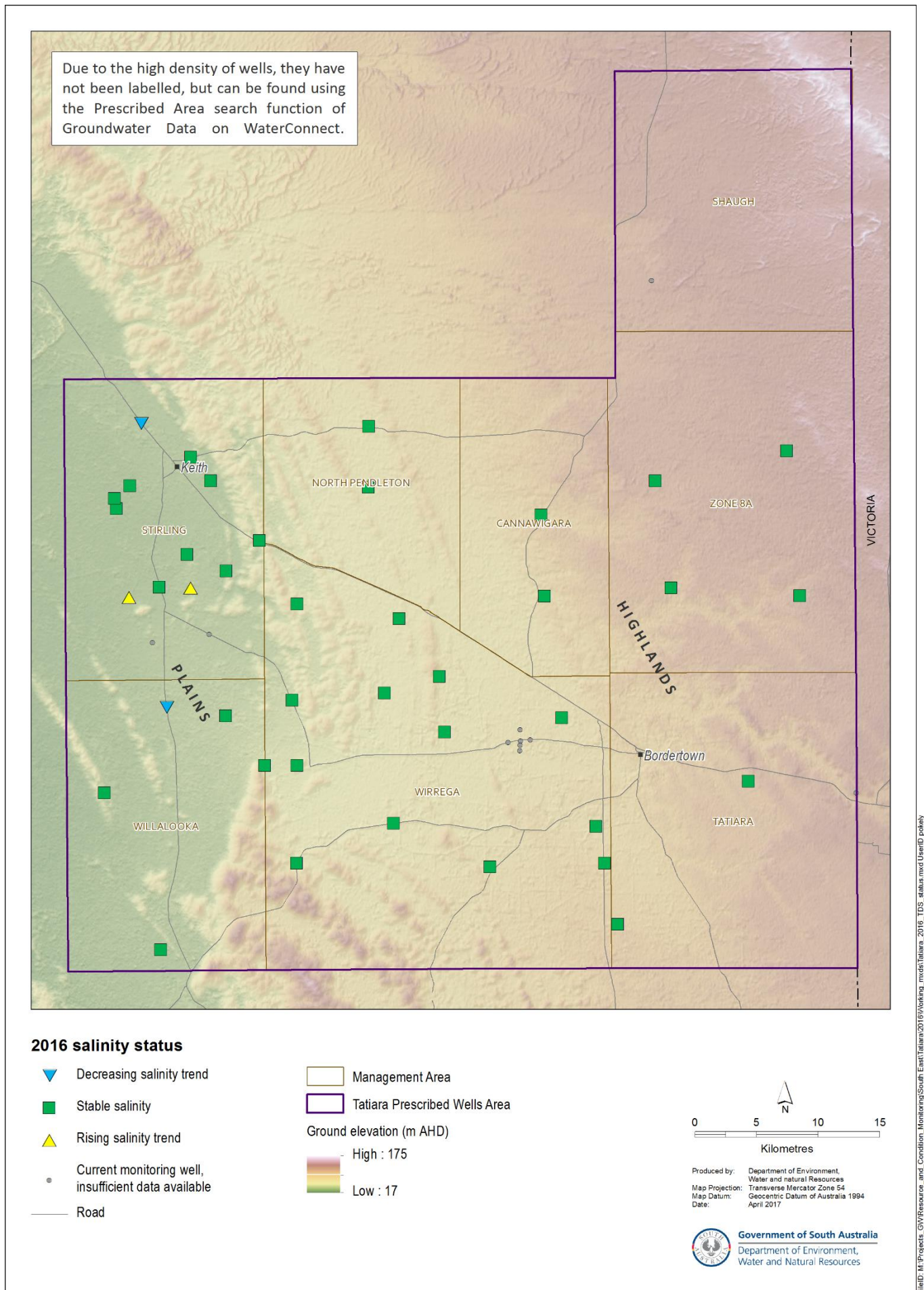


Figure 6. 2016 status of groundwater salinity in the unconfined aquifer (Tatiara PWA), based on five-year trend from 2012 to 2016



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