

# Padthaway PWA Unconfined aquifer

2017 Groundwater level and salinity status report



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# 2017 Status summary

## Padthaway PWA

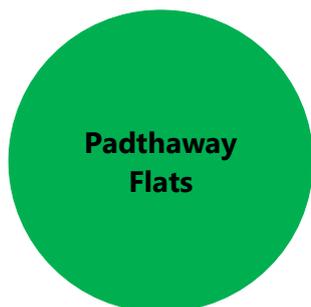
### Unconfined aquifer

Due to the vast area, different land uses and geomorphology of the Padthaway Prescribed Wells Area (PWA), the unconfined aquifer has been divided into two Management Areas: Padthaway Range and Padthaway Flats (Figure 4), with a status assigned to each area.



The Padthaway Range Management Area has been assigned a **green** status for 2017 because positive trends have been observed over the past five years.

The status is based on five-year trends: over the period 2013–17, 58% of wells show rising or stable groundwater levels and 100% show stable salinities.



The Padthaway Flats Management Area has been assigned a **green** status for 2017 because positive trends have been observed over the past five years.

The status is based on five-year trends: over the period 2013–17, 75% of wells show rising or stable groundwater levels and 75% show decreasing or stable salinities.

This status report does not seek to evaluate the sustainable limits of the resource, nor does it make any recommendations on management or monitoring of the resource. These actions are important, but occur through separate processes such as prescription and water allocation planning.

#### Rainfall

See Figures 1 and 2

Rainfall station	Marcollat Bureau of Meteorology (BoM) rainfall station 26017, located in the north-west of the PWA
Annual total <sup>1</sup>	717 mm 234 mm (48%) greater than the five-year average of 483 mm 196 mm (38%) greater than the long-term average of 521 mm
Monthly summary	Well-above average rainfall recorded for July, September, October, December, January, March and April Well-below average rainfall recorded for November and June
Spatial distribution	Rainfall in 2016–17 was well-above average across the entire PWA

<sup>1</sup> For the water-use year 1 July 2016 to 30 June 2017

## Water use

See Figure 3

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Total allocated volume: 2016–17	56 723 ML
Licensed groundwater extractions*	21 460 ML <sup>2</sup> (38% of total allocation)
Extraction volume comparison	46% less than the previous year 32% less than the five-year average

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\*Stock and domestic use is not included in licensed extractions

## Groundwater level

See Figure 4

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Five-year trend: 2013–17	
Padthaway Range	4 out of 12 wells (33%) show rising trends, at rates of 0.05–0.14 m/y (median of 0.08 m/y) 3 wells (25%) are stable 5 wells (42%) show declining trends, at rates of 0.02–0.13 m/y (median of 0.04 m/y)
Padthaway Flats	15 out of 28 wells (54%) show rising trends, at rates of 0.04–0.13 m/y (median of 0.06 m/y) 6 wells (21%) are stable 7 wells (25%) show declining trends, at rates of 0.02–0.25 m/y (median of 0.07 m/y)

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## Groundwater salinity

See Figures 5 and 6

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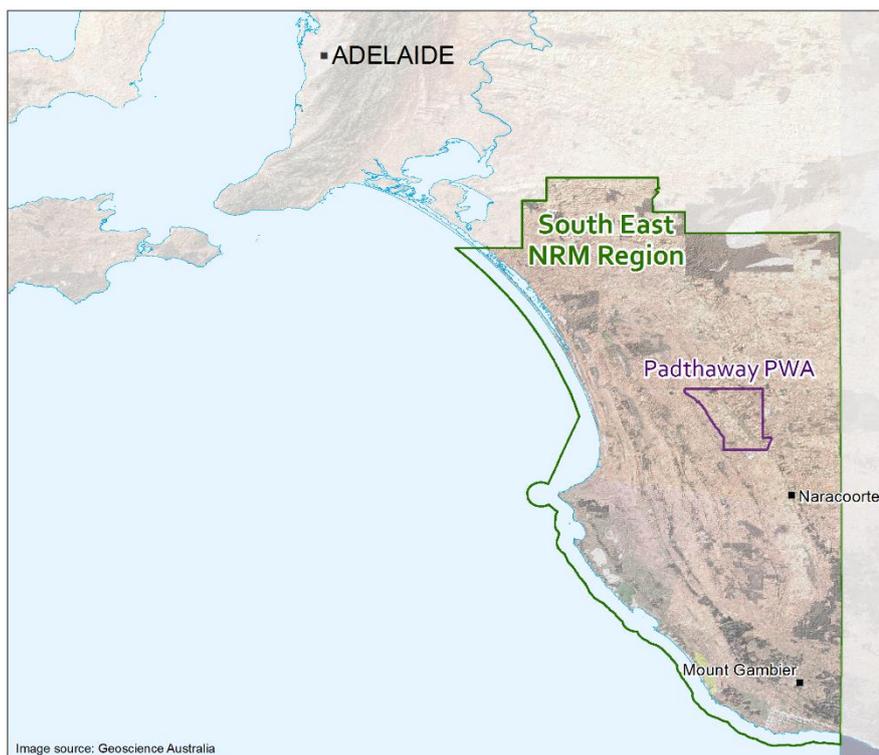
2017 salinity	950–8736 mg/L 15 out of 33 wells (45%) show salinities less than 1500 mg/L
Five-year trend: 2013–17	
Padthaway Range	All 9 wells (100%) are stable
Padthaway Flats	3 out of 20 wells (15%) show decreasing trends, at rates of 20–72 mg/L/y (median of 44 mg/L/y) 12 wells (60%) are stable 5 wells (25%) show an increasing trend, at rates of 24–58 mg/L/y (median of 50 mg/L/y)

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<sup>2</sup> Total licensed extractions are subject to change as extraction data have not yet been verified in full – see [More information](#)

# Regional setting



The Padthaway PWA is located approximately 250 km south-east of Adelaide, in the (upper) South East Natural Resources Management Region. It is a regional-scale resource for which groundwater is prescribed under South Australia's *Natural Resources Management Act 2004*. A water allocation plan (WAP) provides for the sustainable management of the groundwater resources.

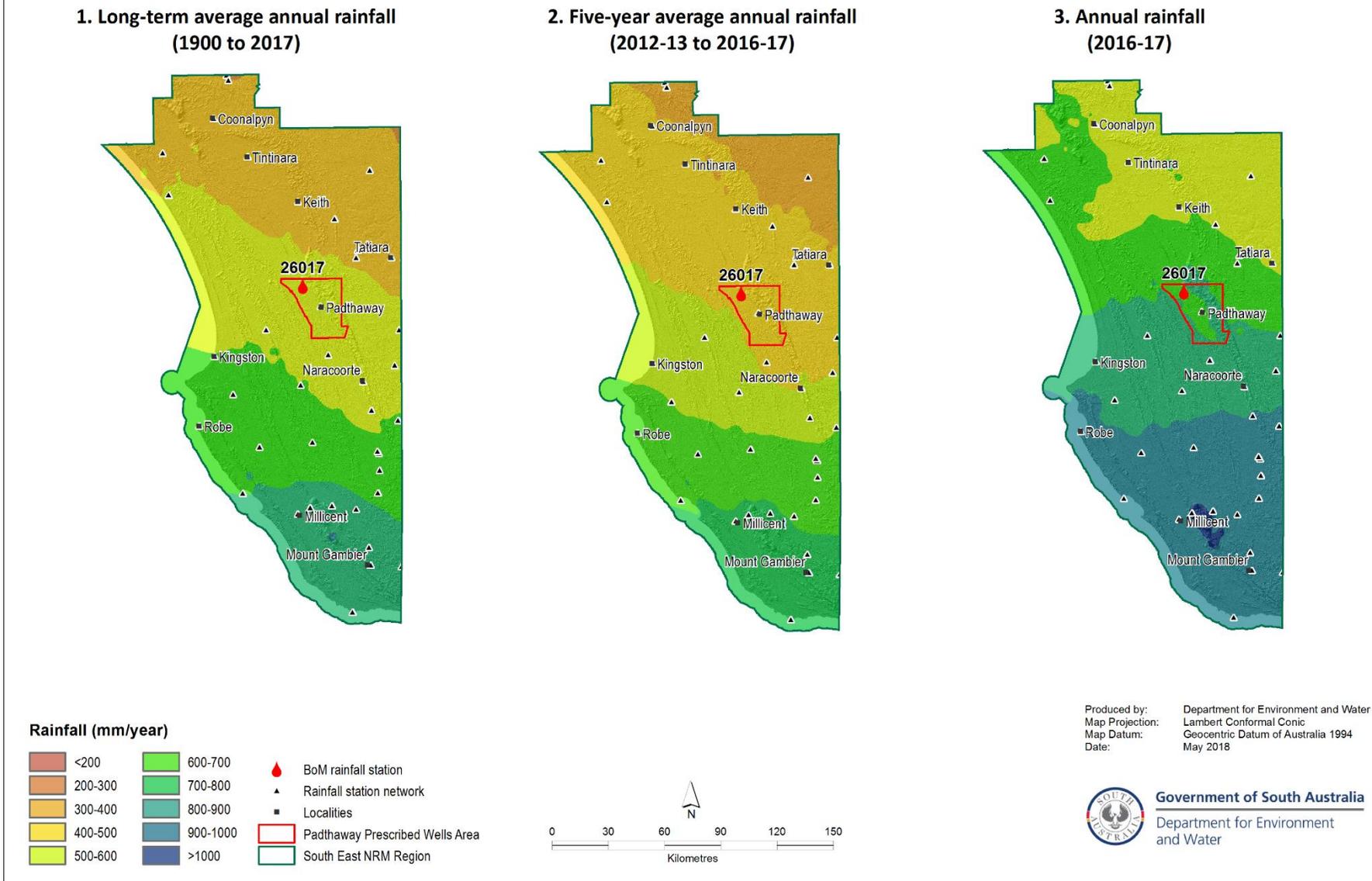
The Padthaway PWA is underlain by sediments of the Murray and Gambier Basins, and can be divided topographically into two discrete landforms, each with different hydrogeological characteristics and groundwater management issues. The Padthaway Range lies to the east, with the low-lying Padthaway Flats to the west (Fig. 4). Both regions are underlain by an unconfined aquifer comprising various Quaternary and Tertiary limestones, sandstones and sands. The confined Tertiary sand aquifer is generally thin or absent in the Padthaway PWA. The unconfined aquifer of the Padthaway PWA is the focus of this report.

The Quaternary-aged Padthaway, Coomandook and Bridgewater Formations form the unconfined aquifer on the Padthaway Flats. The Bridgewater Formation also forms the unconfined aquifer in the Padthaway Range, where it is underlain by the Tertiary-aged Gambier Limestone. The main source of recharge to the unconfined aquifer is the direct infiltration of rainfall, and groundwater generally flows in a south-westerly direction and changes to north-westerly along the inter-dunal Padthaway Flats.

Trends in groundwater levels and salinities in the Padthaway 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 decline and salinities to increase. Conversely, increased rainfall may result in increased recharge and decreased irrigation extraction, which may cause groundwater levels to rise and salinities to stabilise or decrease.

The response of groundwater levels to rainfall varies between the Padthaway Flats and Padthaway Range Management Areas, primarily due to the depth of the watertable. Groundwater levels are more responsive to rainfall on the low-lying flats 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.

## SOUTH EAST NATURAL RESOURCES MANAGEMENT REGION



**Figure 1. Spatial distribution of (1) Long-term and (2) five-year average annual rainfall, and (3) annual rainfall<sup>3</sup>**

<sup>3</sup> Data sources: SILO Patched Point Dataset <https://silo.longpaddock.qld.gov.au/> and BoM Australian Water Availability Project (<http://www.bom.gov.au/jsp/awap/>) – see [More information](#)

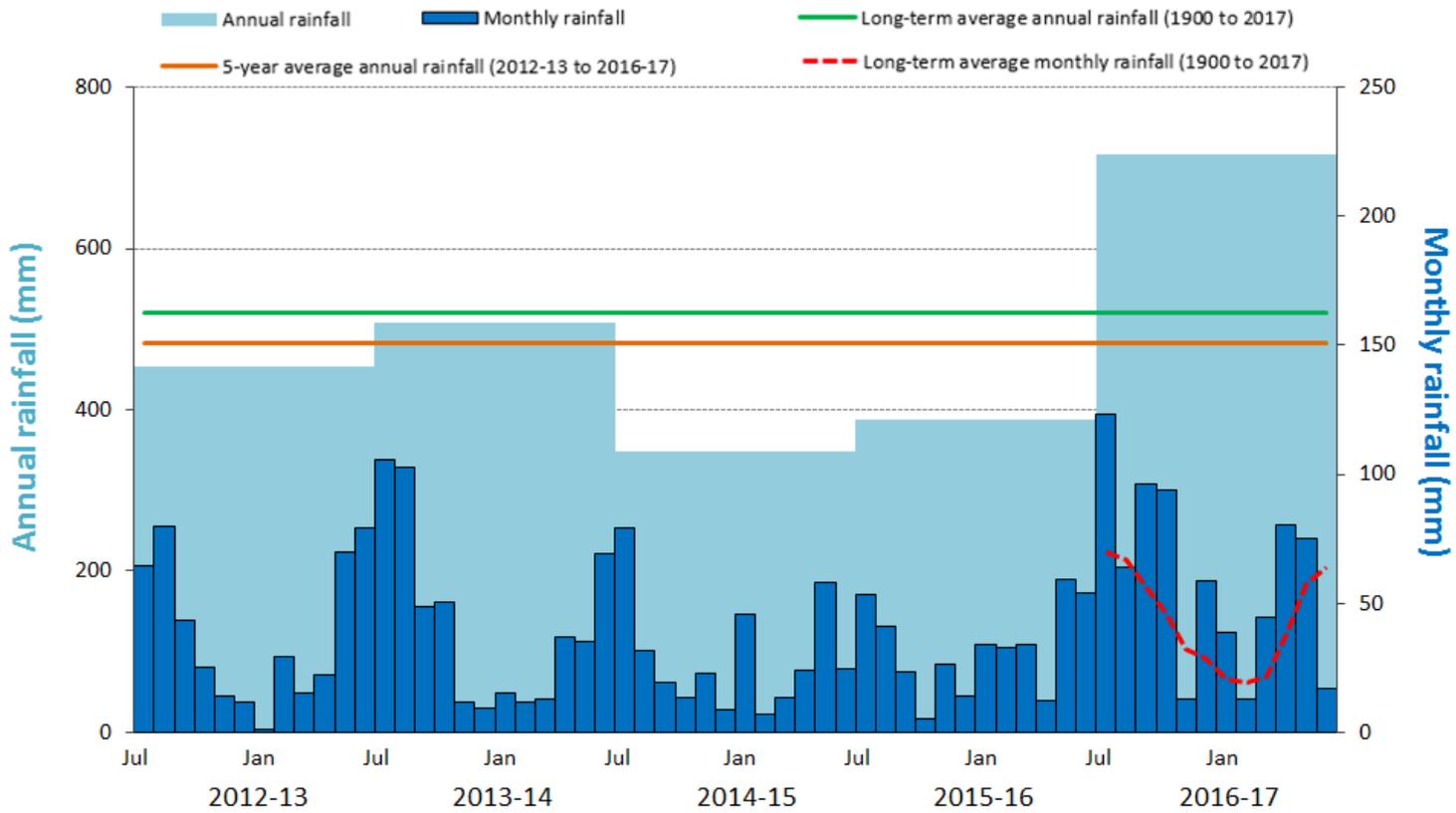


Figure 2. Annual and monthly rainfall for the past five water-use years recorded at Marcollat (BoM Station 26017)<sup>4</sup>

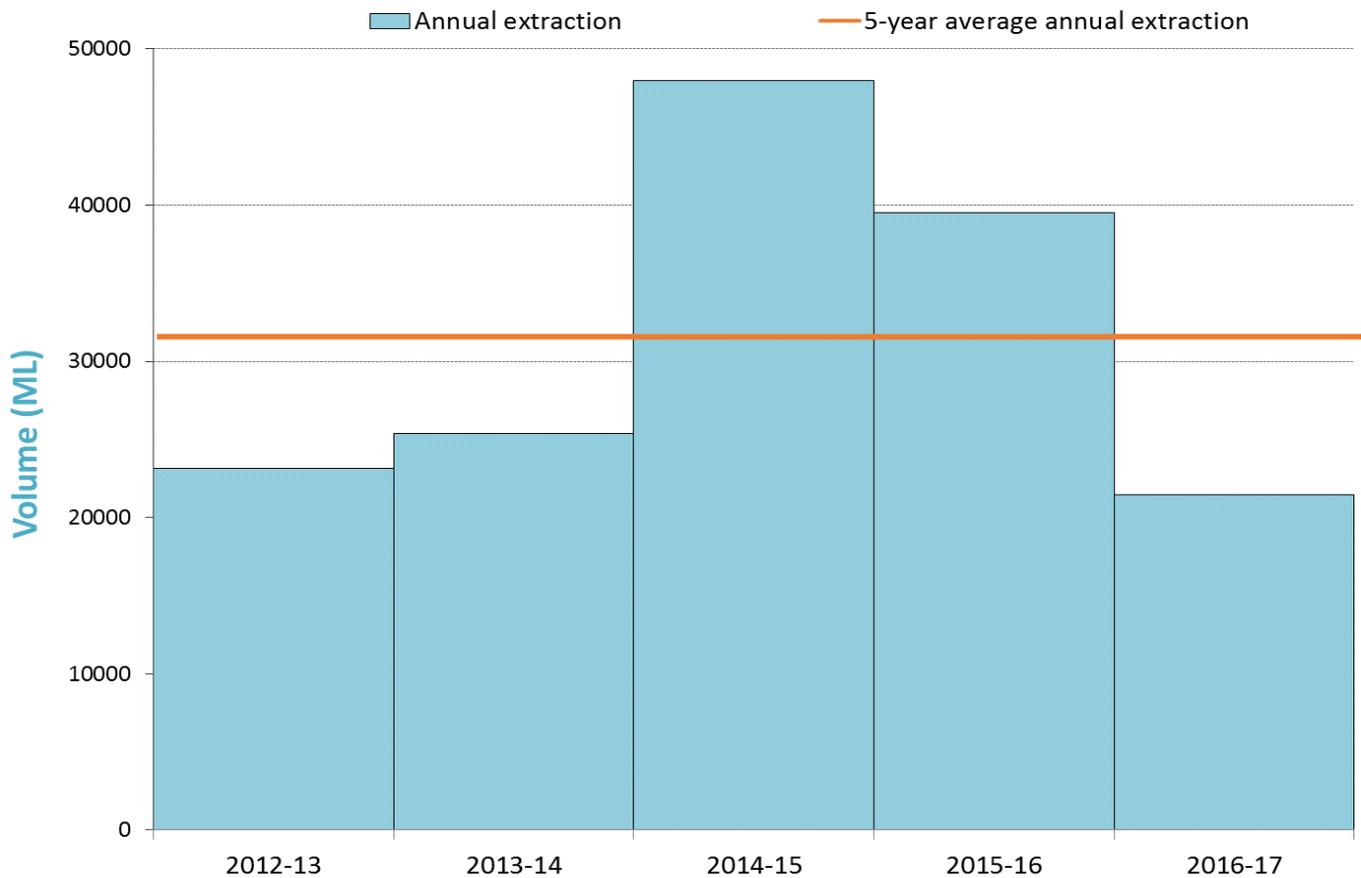
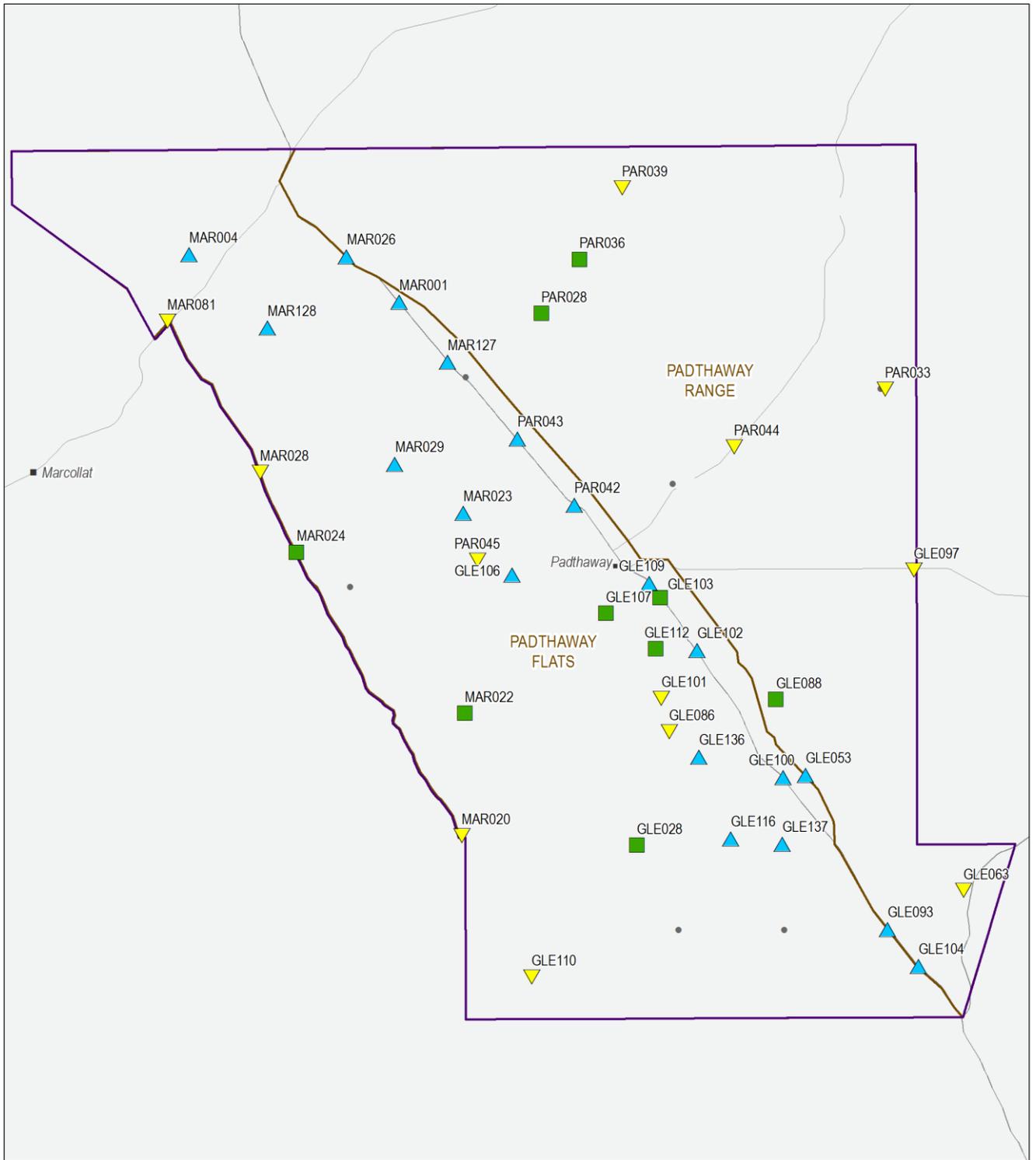


Figure 3. Licensed groundwater extraction volumes<sup>5</sup> for the past five water-use years

<sup>4</sup> Data source: SILO Patched Point Dataset, available <https://silo.longpaddock.qld.gov.au/> – see [More information](#)

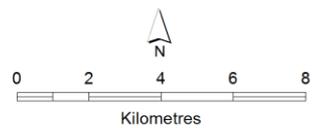
<sup>5</sup> Total licensed extractions are subject to change as extraction data have not yet been verified in full – see [More information](#)



**2017 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 and is stable
- ▼ Groundwater level is the lowest on record and has a declining trend

- Current monitoring well, insufficient data available
- Localities
- Road
- ▭ Management Area
- ▭ Padthaway Prescribed Wells Area



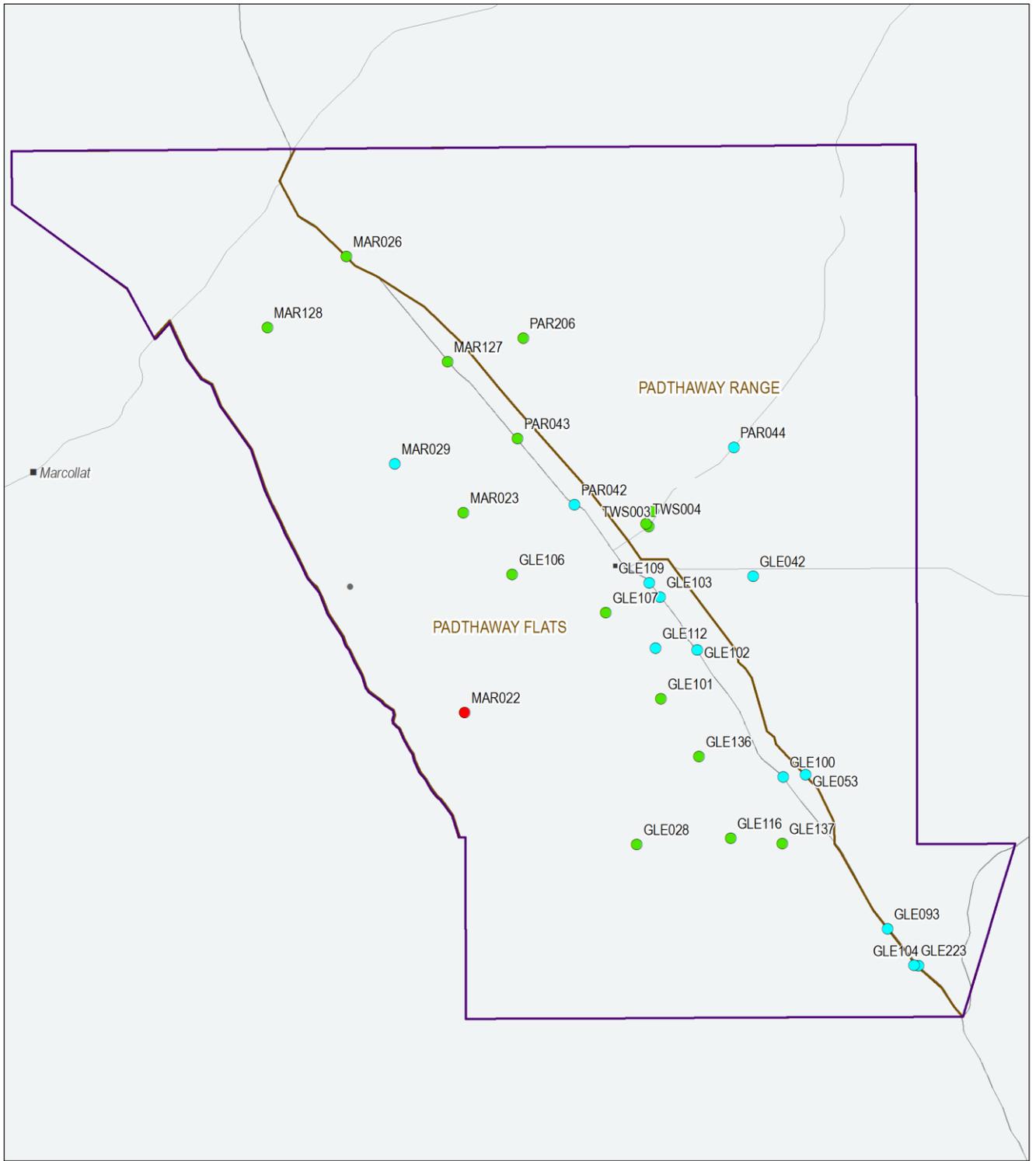
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 Map Datum: Geocentric Datum of Australia 1994  
 Date: May 2018



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**Figure 4. Five-year trends (2013–17) in groundwater levels: unconfined aquifer**

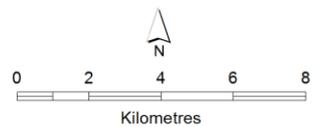
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**2017 salinity (mg/L)**

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

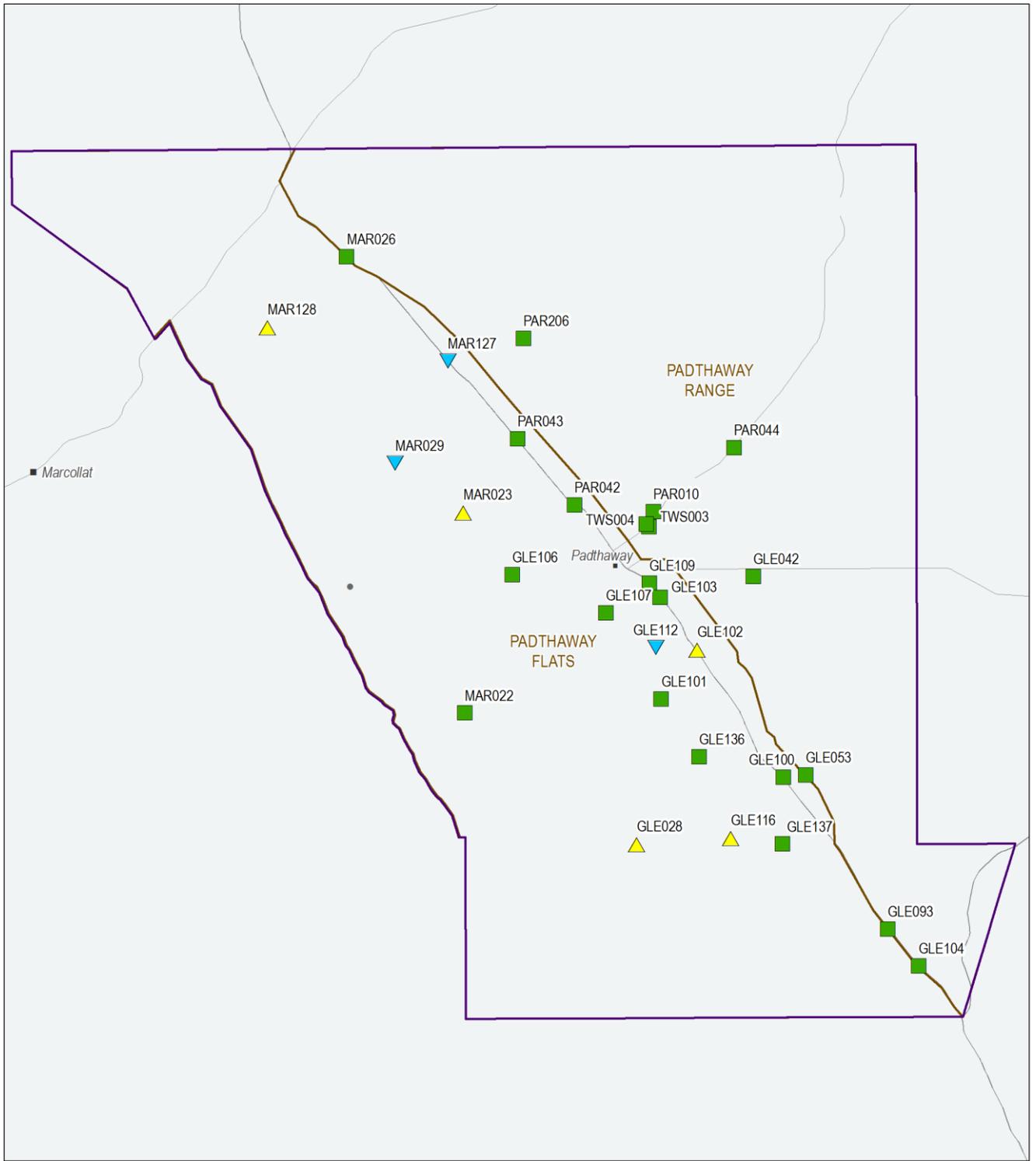
- Current monitoring well, insufficient data available
- Localities
- Road
- ▭ Management Area
- ▭ Padthaway Prescribed Wells Area



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 Map Projection: Transverse Mercator Zone 54  
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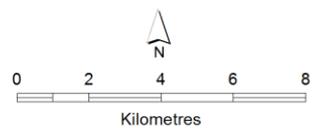
**Figure 5. 2017 groundwater salinities: unconfined aquifer**



**2017 salinity status**

- ▼ Decreasing salinity trend
- Stable salinity
- ▲ Increasing salinity trend

- Current monitoring well, insufficient data available
- Localities
- Road
- Management Area
- Padthaway Prescribed Wells Area



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 Map Projection: Transverse Mercator Zone 54  
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 Date: April 2018



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**Figure 6. Five-year trends (2013–17) in groundwater salinities: unconfined aquifer**

# More information

To determine the status of the unconfined aquifer for the Padthaway Range Management Area and Padthaway Flats Management Area for 2017, the trends in groundwater levels and salinities over the past five years (2013 to 2017, inclusive) were analysed, in contrast to the year-to-year assessments that have been used in *Groundwater level and salinity status reports* published prior to 2015. 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, and to review the full historical record of the monitoring wells, please visit the *Water Resource Assessments* page on [WaterConnect](#).

For additional information related to monitoring wells nomenclature and unique code, please refer to the *Well Details* page on [WaterConnect](#).

The licensed groundwater use for the 2016–17 water-use year is based on the best data available as of April 2018 and may be subject to change, as some extraction volumes may be in the process of verification.

For information completeness and consistency across all the groundwater and salinity status reports, the legend on each map herein shows the full range of water level and salinity status that could possibly be reported. However, the measured data that appear on each map may not span this full range.

Rainfall data used in this report is sourced from the SILO Patched Point Dataset, which uses original BoM daily rainfall measurements and is available online at <https://silo.longpaddock.qld.gov.au/>. Rainfall maps have been compiled using daily gridded data produced by the BoM Australian Water Availability Project ([www.bom.gov.au/jsp/awap/](http://www.bom.gov.au/jsp/awap/)).

The status of the confined groundwater resource is published in a separate report *Prescribed Wells Areas of the South East confined aquifer 2017 Groundwater level and salinity status report*. Please visit the *Water Resource Assessments* page on [WaterConnect](#) to view this report.

To view the Padthaway PWA groundwater level and salinity status report 2011, which includes background information on hydrogeology, rainfall and relevant groundwater-dependent ecosystems, please visit [WaterConnect](#). To view all past published *Groundwater level and salinity status reports*, please visit the [Water Resource Assessments](#) page on WaterConnect.

To download groundwater level and salinity data from monitoring wells within the Padthaway PWA, please visit the *Groundwater Data* page under the Data Systems tab on [WaterConnect](#).

For further details on the Padthaway PWA, please see the *Padthaway Water Allocation Plan* available on the Natural Resources South East [website](#).

## Units of Measurement

mm	millimetre
ML	megalitre
m/y	metres per year
mg/L	milligrams per litre
mg/L/y	milligrams per litre per year
mm/y	millimetres per year



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