

Padthaway PWA Unconfined aquifer

2016 Groundwater level and salinity status report



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Regional setting



The Padthaway Prescribed Wells Area (PWA) is located approximately 250 km south-east of Adelaide, in the (upper) South East Natural Resources Management Region (NRM). It is a regional-scale resource for which groundwater is prescribed under the South Australia's *Natural Resources Management Act 2004*. A water allocation plan provides for the sustainable use 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 low-lying Padthaway Flat lies to the west, with the Padthaway Range to the east (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 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 Padthaway PWA is the focus of this report.

The Quaternary-aged Padthaway, Coomandook and Bridgewater Formations form the unconfined aquifer on the Padthaway Flat. 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 Flat.

Trends in groundwater levels and salinity 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 fall and salinity to increase. Conversely, increased rainfall may result in increased recharge, decreased irrigation extraction, groundwater levels may rise, and salinity may stabilise or decline. 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 flat 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 Padthaway PWA, the unconfined aquifer has been divided into two resource groups (Fig. 4), with a status assigned to each group.

Padthaway Range Management Area

The Padthaway Range Management 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 Padthaway Range Management Area is based on:

- most monitoring wells (58%) show a five-year trend of rising or stable groundwater levels
- all monitoring wells show a five-year trend of stable groundwater salinity.

Padthaway Flats Management Area

The Padthaway Flats Management Area 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 Padthaway Flats Management Area is based on:

- all monitoring wells show a five-year trend of declining groundwater levels.

Despite the yellow status assigned to the Padthaway Flats Management Area, most monitoring wells show a five-year trend of stable groundwater salinity.

Rainfall

The Marcollat rainfall station (BoM Station 26017) is located in the north-west of the PWA and recorded 387 mm of rainfall in the 2015–16 water-use year, which is 131 mm (25%) less than the long-term average annual rainfall of 518 mm (1900–2016) and is 46 mm (11%) less than the five-year average annual rainfall of 433 mm (Figs 1 and 2). Trends of declining average annual rainfall are evident when compared to the long term (Fig. 1). In the 2015–16 water-use year, monthly rainfall data show that January, February and March recorded above-average rainfall when compared with their respective long-term monthly averages. However, April, October and December registered rainfall less than one-third their respective long-term monthly average rainfall (Fig. 2).

Water use

In 2015–16, groundwater extractions (excluding stock and domestic use) from the unconfined aquifer totalled 39 524 ML¹, which is 22% less than the previous water-use year and represents 70% of the total allocation volume for the Padthaway PWA (Fig. 3).

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

Groundwater levels

In the Padthaway Range Management Area, and in the five years to 2016, seven out of 12 (58%) monitoring wells show a trend of rising or stable groundwater levels. The remaining five wells show a declining trend at a median rate of 0.06 m/y (Fig. 4).

In the Padthaway Flat Management Area, and for the five years to 2016, all 28 monitoring wells have shown a trend of falling groundwater levels, at a median rate of 0.06 m/y. Notably, 25% of these monitoring wells show their lowest level on record in 2016. These wells are located mainly on the western boundary of the PWA.

Groundwater salinity

Groundwater salinities in the shallow unconfined aquifer are influenced by rainfall patterns and the efficiency of various irrigation practices, and are therefore variable across both management areas. In 2016, groundwater salinities range between 970 and 7775 mg/L across the PWA with 50% of these monitoring wells showing salinities above 1500 mg/L (Fig. 5). In the five years to 2016, most wells (79%) show stable salinity (Fig. 6), while four wells (13%) show increasing salinities at a median rate of 58 mg/L/y. A decrease in salinity at a rate of 32 mg/L/y was observed in one well.

More information

To determine the status of the unconfined aquifer of the Padthaway PWA for 2016, the trend in groundwater levels 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 *Padthaway PWA groundwater level and salinity status report 2011*, which includes background information on hydrogeology, rainfall and groundwater-dependent ecosystems, and descriptions of all status symbols, visit [WaterConnect](#).

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

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

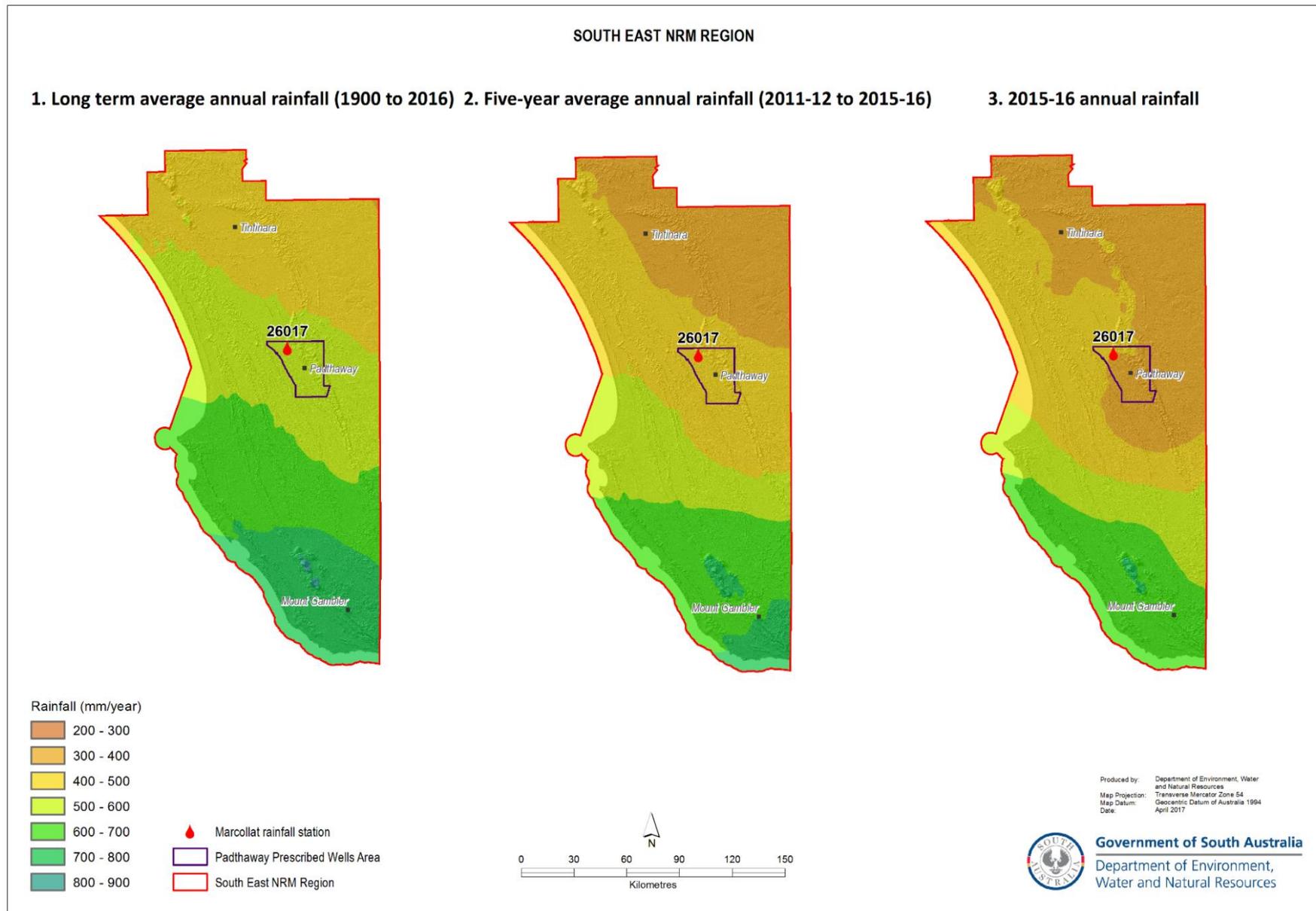


Figure 1. (1) Long-term and (2) five-year average annual rainfall, and (3) annual rainfall for the 2015–16 water-use year in the South East NRM Region²

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.

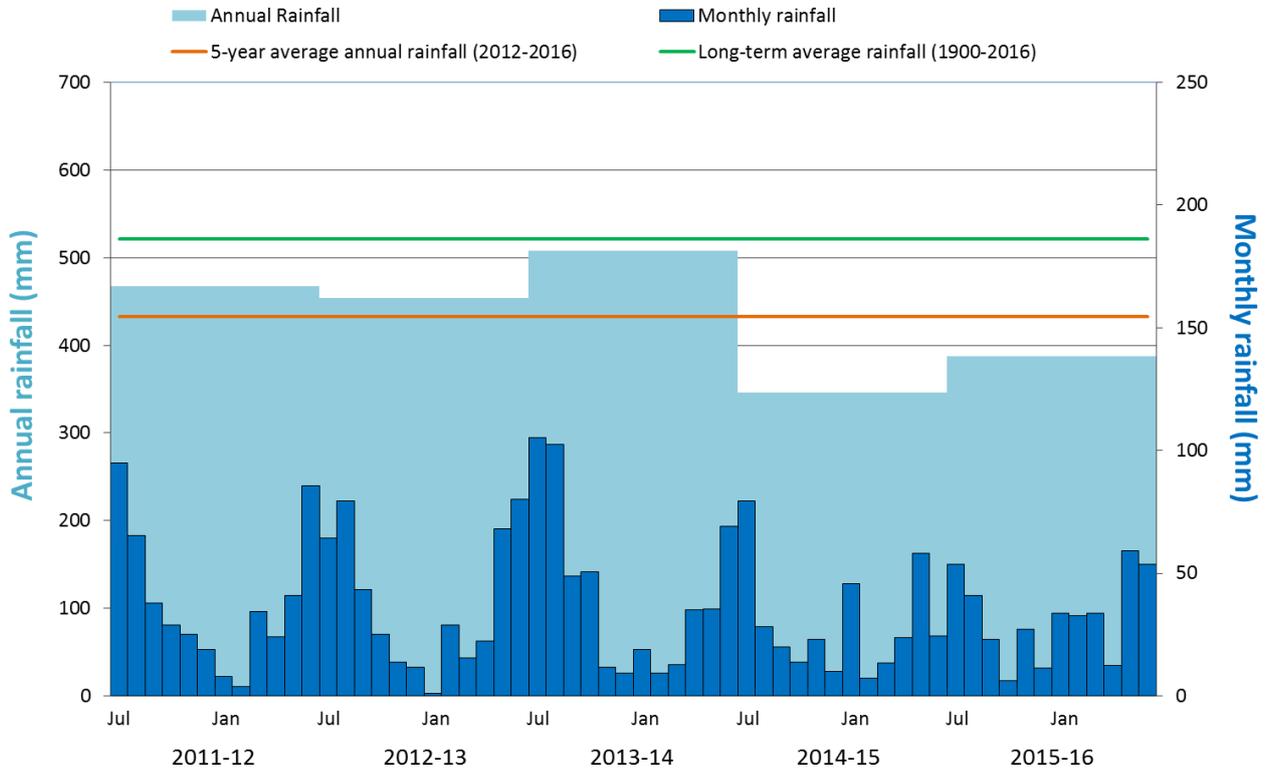


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Marcollat (BoM Station 26017)³

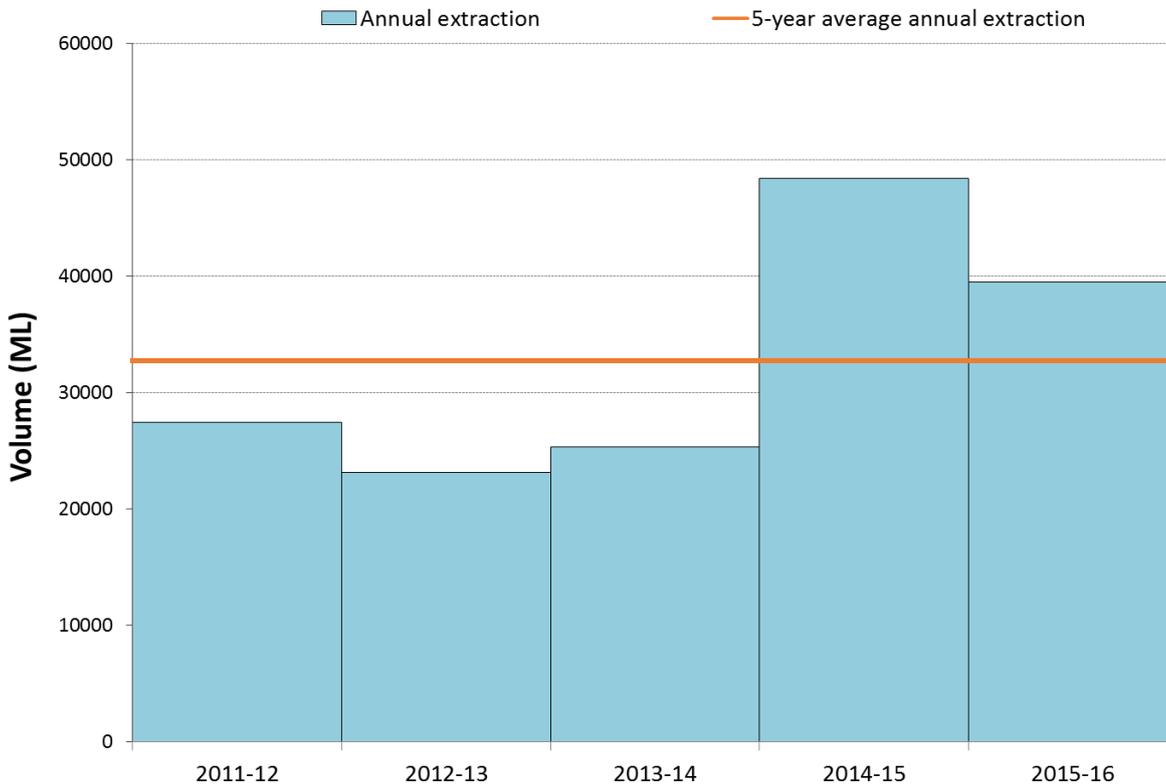
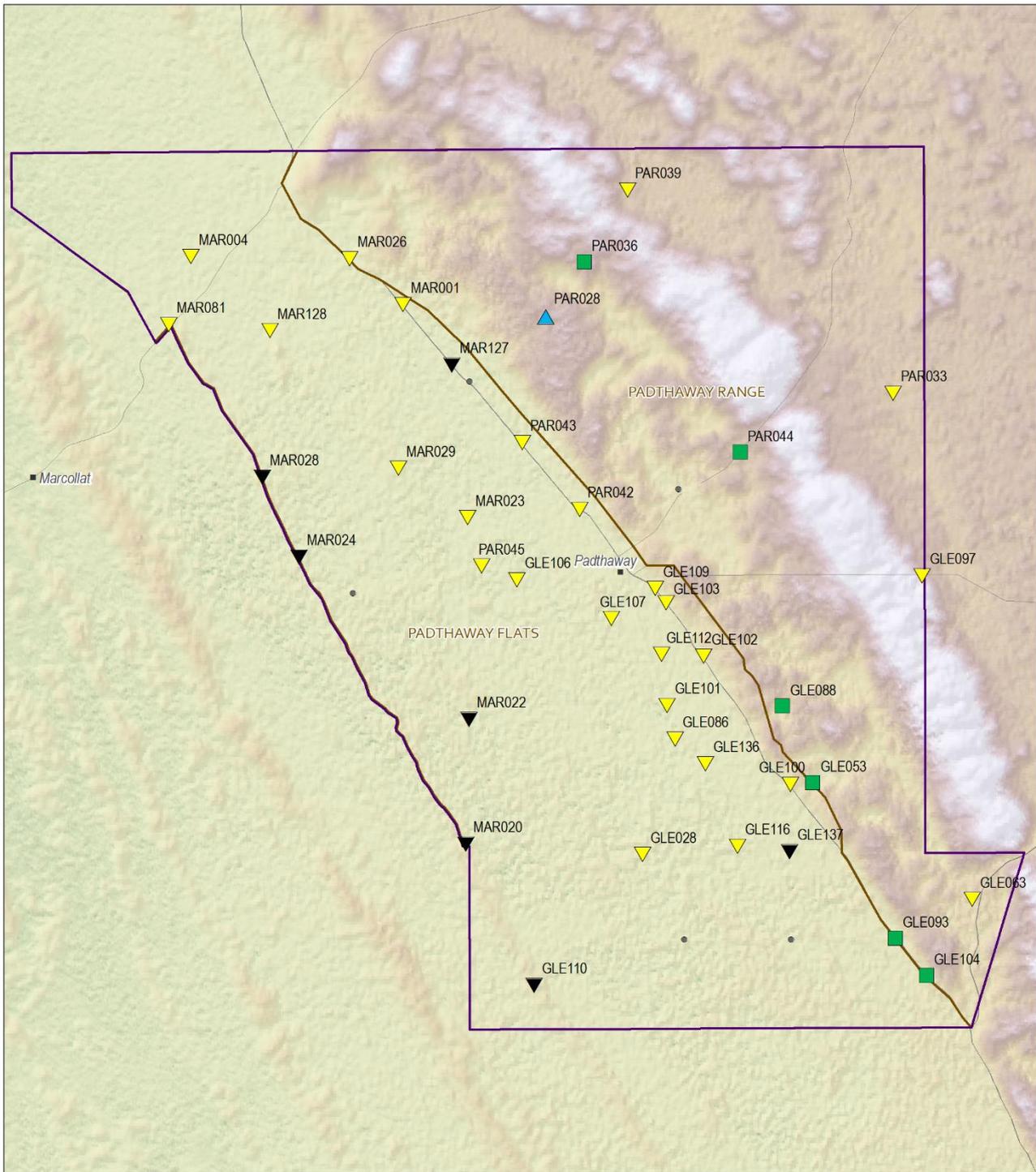


Figure 3. Licensed groundwater extraction volumes⁴ for the past five water-use years, from the unconfined aquifer (Padthaway PWA)

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.

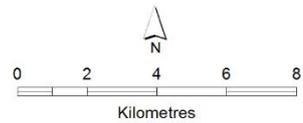
⁴ The licensed groundwater use for the 2015–16 water-use year is based on the best data available as of April 2017 and could be subject to change, as some of extraction volumes may be in the process of being verified.



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
- Padthaway Prescribed Wells Area
- Ground elevation (m AHD)
 - High : 182
 - Low : 0



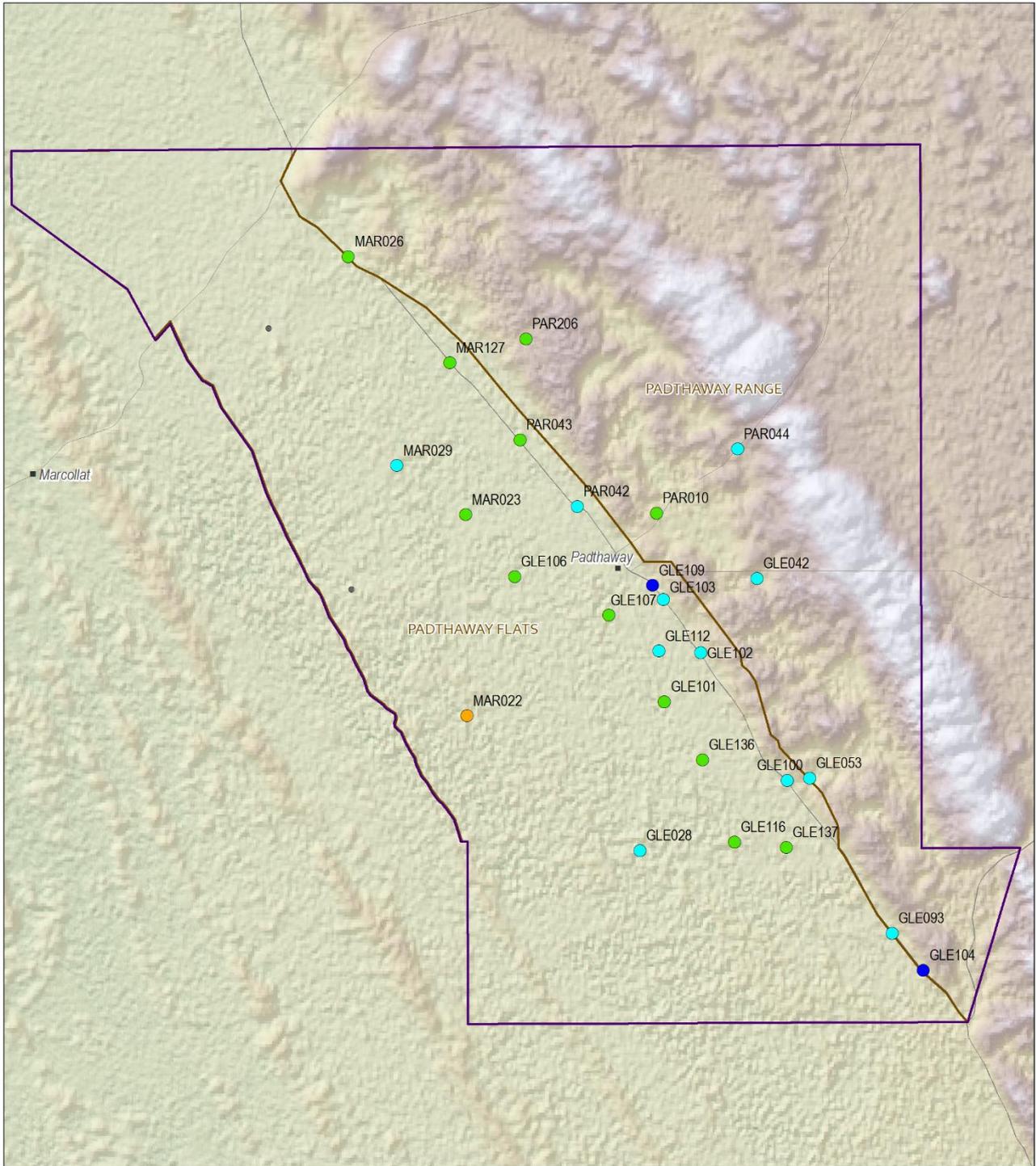
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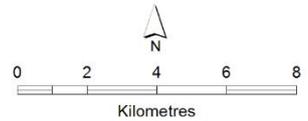
Figure 4. 2016 status of groundwater levels in the unconfined aquifer (Padthaway PWA), based on five-year trend from 2012 to 2016



2016 salinity (mg/L)

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

- Road
- ▭ Management
- ▭ Padthaway Prescribed Wells Area
- Ground elevation (m AHD)
- High : 182
- Low : 0



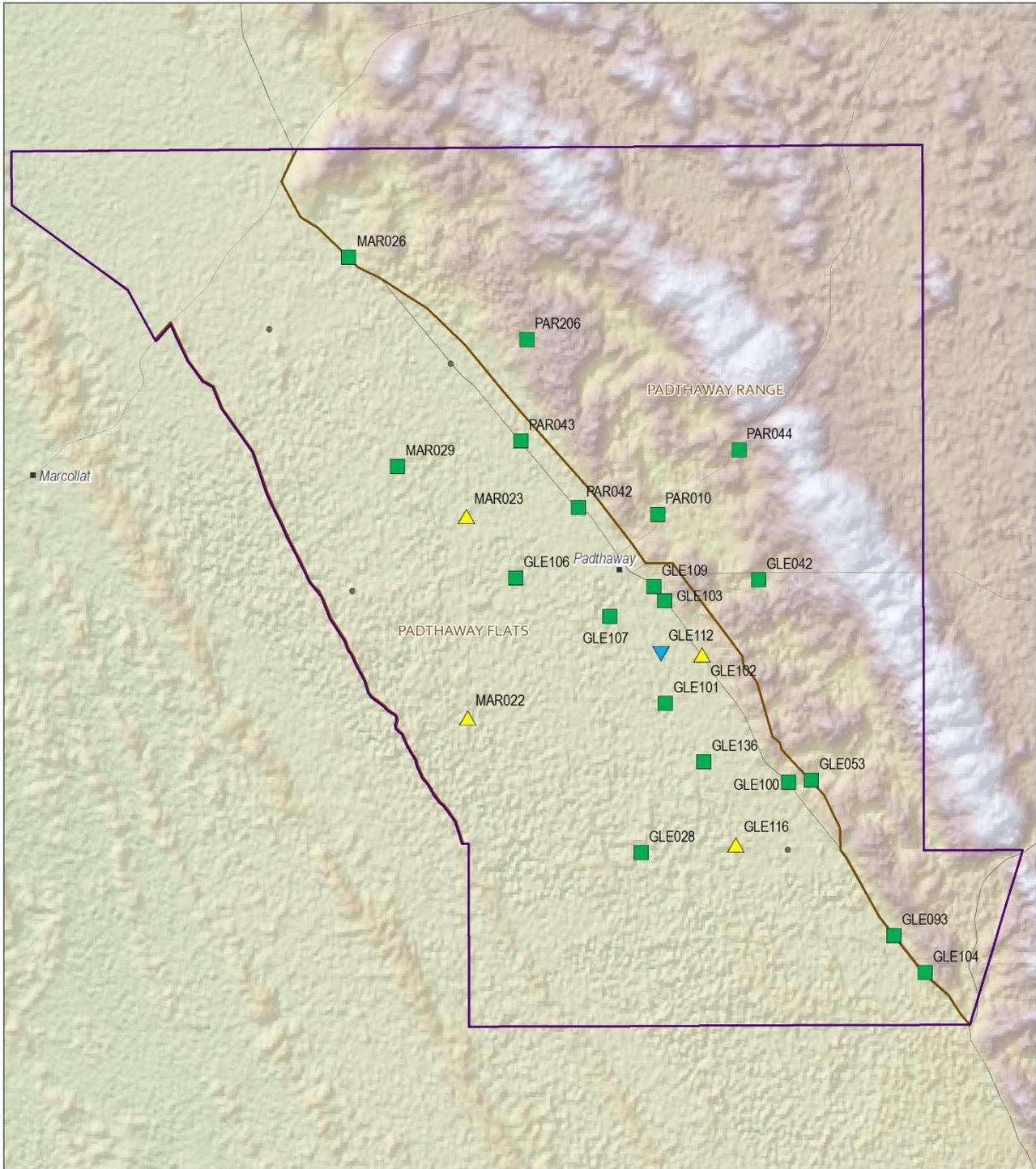
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Figure 5. 2016 groundwater salinity of the unconfined aquifer (Padthaway PWA)

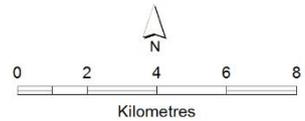
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2016 salinity status

- ▼ Decreasing salinity trend
- Stable salinity
- ▲ Rising salinity trend
- Current monitoring well, insufficient data available

- Road
- ▭ Management
- ▭ Padthaway Prescribed Wells
- Ground elevation (m AHD)
- High : 182
- Low : 0



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



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