

Lower Macquarie Sandstone Groundwater Sources

Groundwater annual report 2023.

Introduction

This report is a summary of water accounts, volume pumped and groundwater levels for the Lower Macquarie sandstone groundwater sources for the period 1 July 2021 to 30 June 2023 including the start of year water account volumes for the 2023/2024 water year.

For detailed information of the hydrogeology, management and past long-term water level behaviour of these water sources refer to the Groundwater Resource Description Report for the Macquarie-Castlereagh Alluvium:

www.industry.nsw.gov.au/___data/assets/pdf_file/0017/192221/macquarie-castlereagh-alluvium-appendix-a-water-resource-description.pdf

Description

The Lower Macquarie groundwater sources are located within the Macquarie-Castlereagh River catchment. Six separate groundwater sources make up the Lower Macquarie, three of these are sandstone (included in this report):

- Lower Macquarie Zone 3 Groundwater Source
- Lower Macquarie Zone 4 Groundwater Source
- Lower Macquarie Zone 5 Groundwater Source

The Lower Macquarie sandstone groundwater sources (Figure 1) extend north-west from Narromine.

The Lower Macquarie sandstone groundwater sources comprise mainly quartzose sandstone known as the Pilliga Sandstone, with minor siltstone and mudstone, of the Surat Basin of Mesozoic age (250 to 65 million years old).

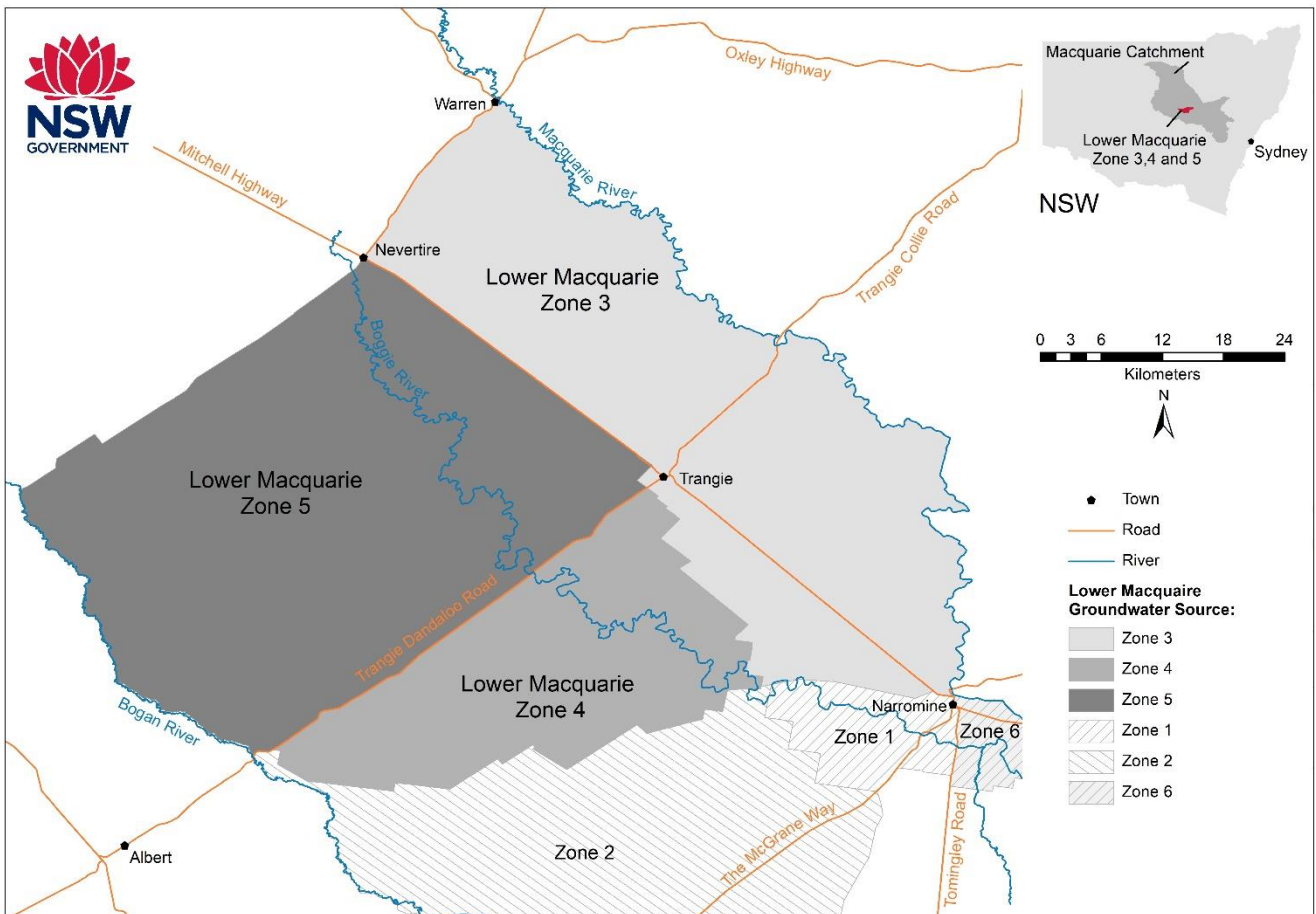
Water resource management

Water sharing plan

The Lower Macquarie sandstone groundwater sources are managed by the rules defined in the Water Sharing Plan for the Macquarie-Castlereagh Alluvial Groundwater Sources 2020.

The water sharing plans are available for viewing on the Department of Planning and Environment Water website at: water.dpie.nsw.gov.au/plans-and-programs/water-sharing-plans/status/macquariecastlereagh-region

Figure 1: Location map



Basic rights

Basic landholder rights are available in this groundwater source for domestic and stock watering requirements. Whilst landholders don't need an access licence to take water for stock and domestic purposes from groundwater underlying their property, the bore must be authorised by WaterNSW.

The volumes of water set aside in the water sharing plan for basic landholder rights are:

- Lower Macquarie Zone 3: 402 megalitres (ML)
- Lower Macquarie Zone 4: 226 ML
- Lower Macquarie Zone 5: 473 ML

An approval holder is responsible for monitoring water quality from the bore to ensure it is suitable for its intended purpose for the duration of the approval. Inherent water quality and land use activities may make the water in some areas unsuitable for use. Water from the groundwater sources should not be used without first being tested and, if necessary, appropriately treated to ensure it is fit for purpose. Such testing and treatment are the responsibility of the water user.

Groundwater access licences

Groundwater access licence share components to 30 June 2023 are presented in Table 1.

Table 1: Lower Macquarie sandstone groundwater sources share component at 30 June 2023

Groundwater Source	Lower Macquarie Zone 3		Lower Macquarie Zone 4		Lower Macquarie Zone 5	
	Number of Licences	Total Volume	Number of Licences	Total Volume	Number of Licences	Total Volume
Local Water Utility ¹	1	350	0	0	0	0
Aquifer ²	28	8,264	7	5,103	7	2,477

¹Megalitres/year (ML)

² Megalitres per unit share

Extraction limit

All groundwater sharing plans have rules to manage extraction in a water source to the long-term average annual extraction limit.

The extraction limits for the Lower Macquarie sandstone groundwater sources are listed in Table 2.

Table 2: Extraction limits for the Lower Macquarie sandstone groundwater sources

Water Source	Extraction limit (ML/year)
Lower Macquarie Zone 3 Groundwater Source	9,752
Lower Macquarie Zone 4 Groundwater Source	5,326
Lower Macquarie Zone 5 Groundwater Source	2,871

Extraction in the Lower Macquarie sandstone groundwater sources is not compliant if the 5 years average annual extraction is more than 105% of the extraction limit (known as the compliance trigger). If average extraction exceeds the compliance trigger, then the available water

determination made for aquifer access licences for the following water year, may be reduced by an amount that would return subsequent total water extraction to the extraction limit.

Information on tracking groundwater extraction against extraction limit for the groundwater source including the likelihood of compliance being triggered in the current water year can be found at: water.dpie.nsw.gov.au/allocations-availability/extraction-limits/tracking-groundwater

For each inland groundwater source, the tracking dashboard shows for the current water year:

- volume that if extracted will reach the compliance trigger (in ML, calculated annually)
- volume remaining to be extracted before reaching the compliance trigger (in ML, calculated throughout the year)
- the likelihood that access to groundwater may be reduced in the next water year.

Note: the information on the dashboard is limited by the extraction data available at the time.

Available water

Total water availability in a water year is controlled by the available water determinations credited to an access licence account, and the carryover rules that dictate the allowable volume to be brought forward from one year to the next.

Total available water for use is controlled by the annual account usage limits, which define the maximum volume of allocated water that can be taken in that water year. The rules and limits that are applicable to the Lower Macquarie sandstone groundwater sources are provided in Table 3.

Table 3: Lower Macquarie sandstone groundwater sources access licence account rules

Access Licence Category	Carryover Limit	Annual Use Limit	Maximum AWD
Local Water Utility	0%	100%	100%
Aquifer	0.62 ML/share	1.44 ML/share	1 ML/share

The maximum amount of water that can be debited from an aquifer access licence account in a water year can't exceed 1.44 ML per unit share component (annual use limit) plus any allocation transferred in (temporary trade), and minus any allocation transferred out. This means that metered extraction plus transfers out can't exceed 144 per cent of the of share component, unless water is transferred in.

Total account water for period 2014/2015 to 2023/2024 is displayed in Figure 2, Figure 3 and Figure 4 showing the proportion available for use and what is not available for use in a year. Total yearly extraction is also displayed. Note, all access licence categories have been combined in these figures.

There has been no reduction in the available water determination (AWD) for aquifer access licences in the Lower Macquarie sandstone groundwater sources since the water sharing plan first started in 2006.

The access licence account information for the Lower Macquarie sandstone groundwater sources on 1 July 2023 is summarised in Table 4.

Table 4: Licence account information for Lower Macquarie sandstone groundwater sources on 1 July 2023

Lower Macquarie Groundwater Source	Zone 3	Zone 4	Zone 5
Carryover In:	5,124 ML	3,164 ML	1,536 ML
Available water determination:	8,614 ML	5,103 ML	2,477 ML
Total water in account:	13,738 ML	8,267 ML	4,013 ML
Total water available for use:	12,250 ML	7,348 ML	3,567 ML

Figure 2: Account water availability and usage summary for Lower Macquarie Zone 3 Groundwater Source

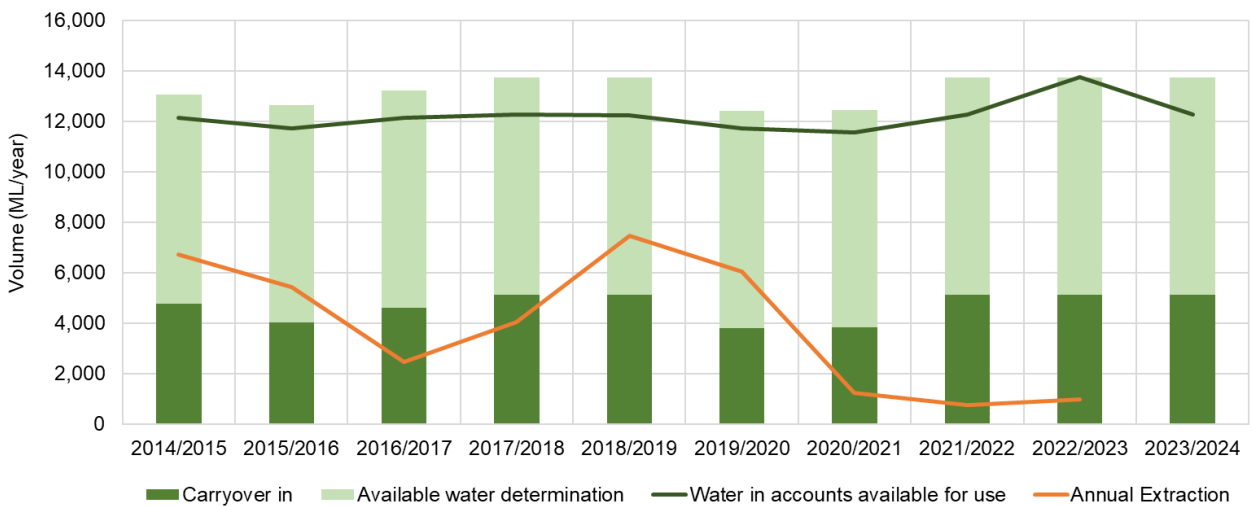


Figure 3: Account water availability and usage summary for Lower Macquarie Zone 4 Groundwater Source

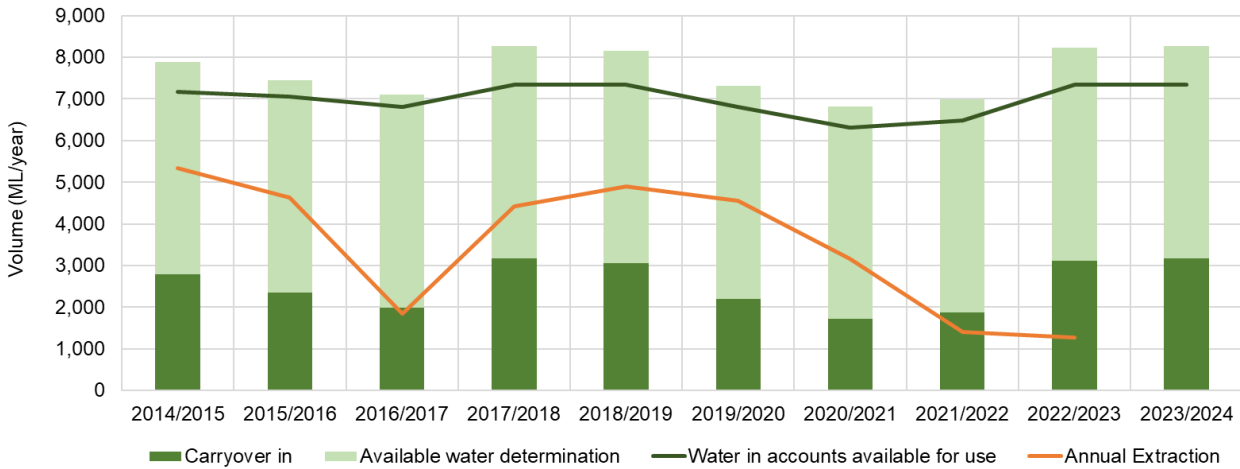
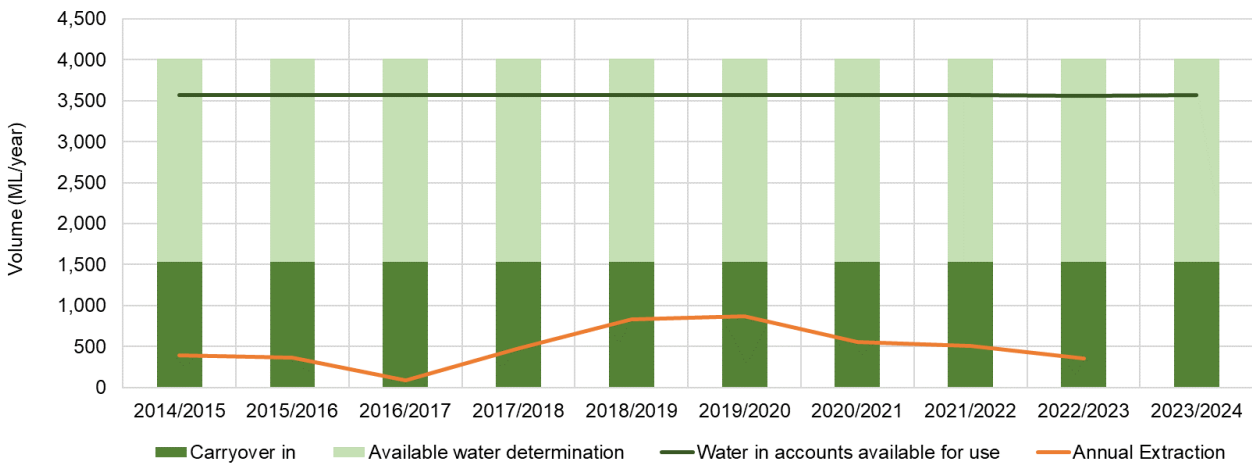


Figure 4: Account water availability and usage summary for Lower Macquarie Zone 5 Groundwater Source



Groundwater trading

Trades are permitted between the Lower Macquarie Zone 3, Lower Macquarie Zone 4 and Lower Macquarie Zone 5 groundwater sources subject to the rules in the water sharing plan. You can't trade between the Lower Macquarie sandstone groundwater sources and any other groundwater sources.

Allocation assignments (temporary trade)

Trading statistics for the Lower Macquarie Zone 3 Groundwater Source and Lower Macquarie Zone 4 Groundwater Source are illustrated in Figure 5 and Figure 6, respectively; excludes trades for less than \$1 per megalitre. There were no trades in 2022-23.

There have been limited temporary trades in the Lower Macquarie Zone 3 and Lower Macquarie Zone 4 groundwater sources since the water sharing plan was implemented in 2012 as shown in Figure 5 and Figure 6.

No allocation assignments have been recorded for the Lower Macquarie Zone 5 Groundwater Source.

Further information on water licences, approvals, water trade and water dealings and other matters related to water entitlements in NSW can be found on the NSW Water Register at:

waterregister.waternsw.com.au/water-register-frame

Figure 5: Lower Macquarie Zone 3 Groundwater Source temporary trade statistics

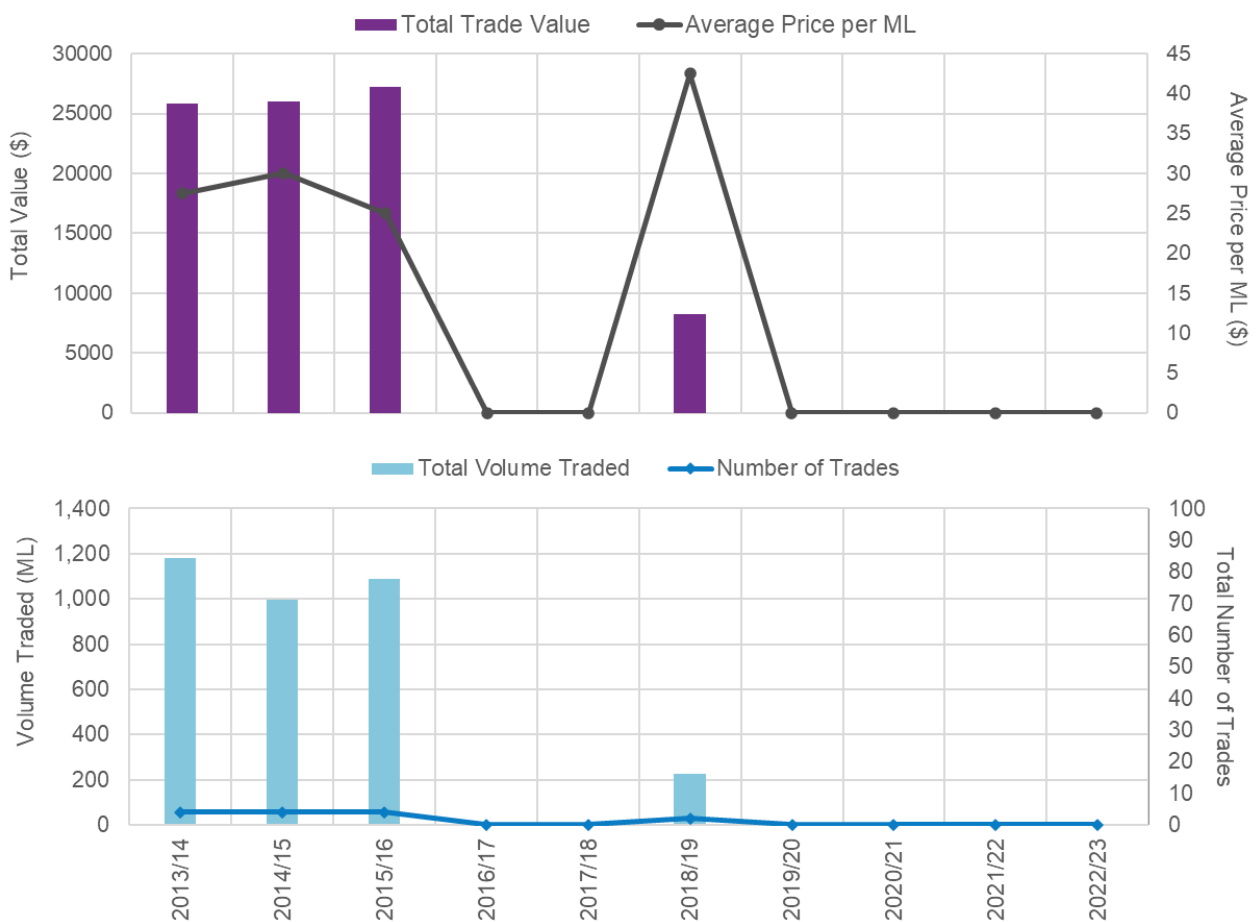
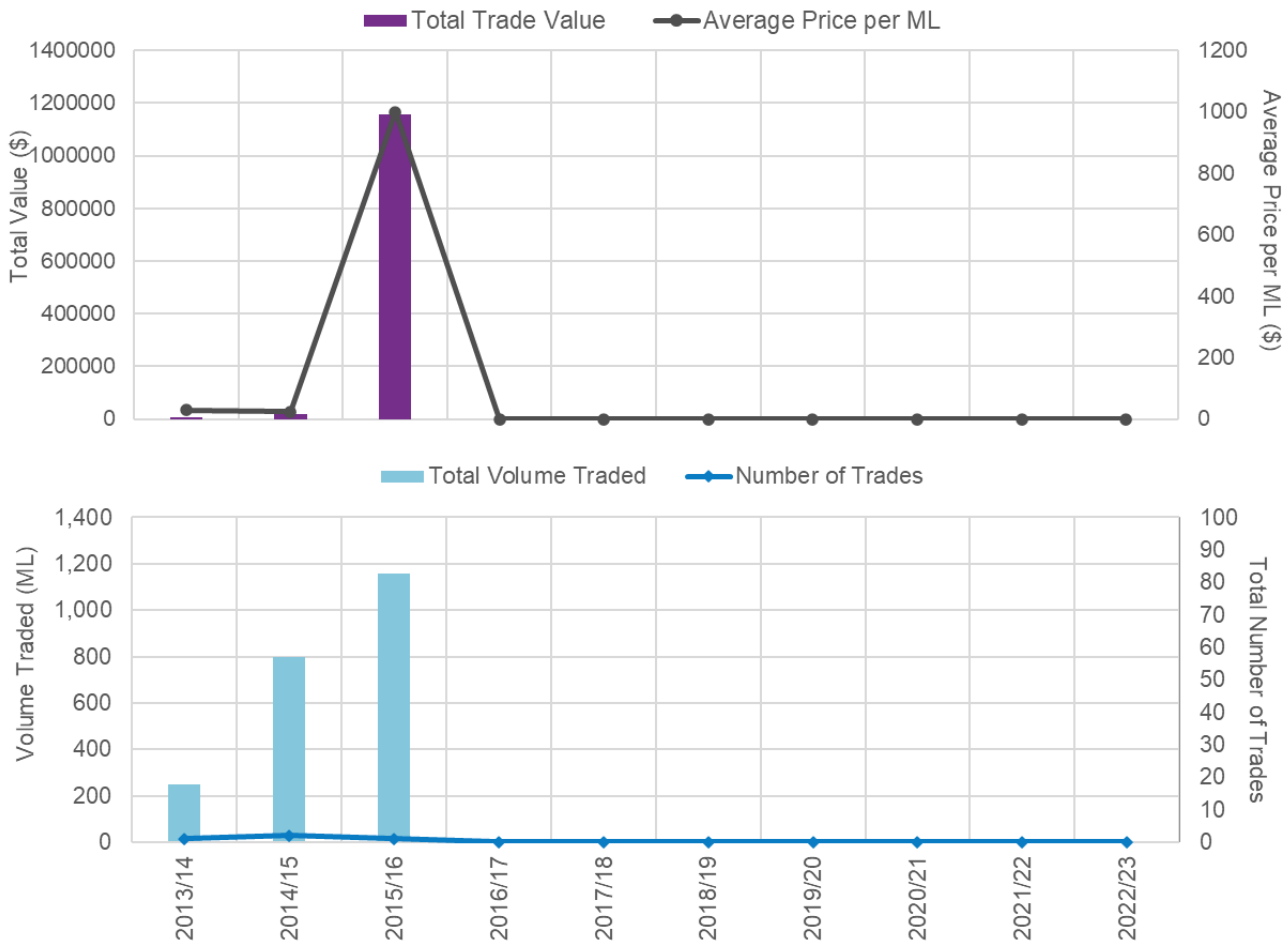


Figure 6: Lower Macquarie Zone 4 Groundwater Source temporary trade statistics



Bores

There are approximately 674 registered bores across the Lower Macquarie sandstone groundwater sources Zones 3, 4 & 5. (Figure 7). The majority of these bores are used for stock and domestic purposes (Basic Landholder Rights). There is also significant use of groundwater for irrigation (Table 5).

Average extraction from individual production bores is around 500 ML/year (Figure 8).

Table 5: Approximate number of licensed bores in Lower Macquarie sandstone groundwater sources (2023)

Groundwater Source	Registered Bore Purpose		
	Basic Landholder Rights	Production	Local Water Utility
Lower Macquarie Zone 3	266	49	11
Lower Macquarie Zone 4	139	11	0

Groundwater Source	Registered Bore Purpose		
	Basic Landholder Rights	Production	Local Water Utility
Lower Macquarie Zone 5	188	10	0

Water level monitoring

WaterNSW monitors groundwater levels at 86 monitoring bores at 63 sites in the Lower Macquarie sandstone groundwater sources (Figure 9). At most monitoring sites there are two or more pipes monitoring different depths. The depth monitored by each pipe reflects the depth where the casing is slotted to allow groundwater entry into the pipe.

A hydrograph is a plot of groundwater level or pressure from a monitoring bore over time. A representative sample of hydrographs from monitoring bores have been selected and are presented in Figure 10 to Figure 23.

Data for the monitored bores as well as private bore information can be obtained from the WaterNSW real time data portal at: realtimedata.waternsw.com.au/

It includes data for 14 groundwater monitoring sites in real-time via telemetry. You can also request information via: Customer.Helpdesk@waternsw.com.au

Figure 7: Lower Macquarie sandstone groundwater sources Zones 3, 4 & 5 registered bores

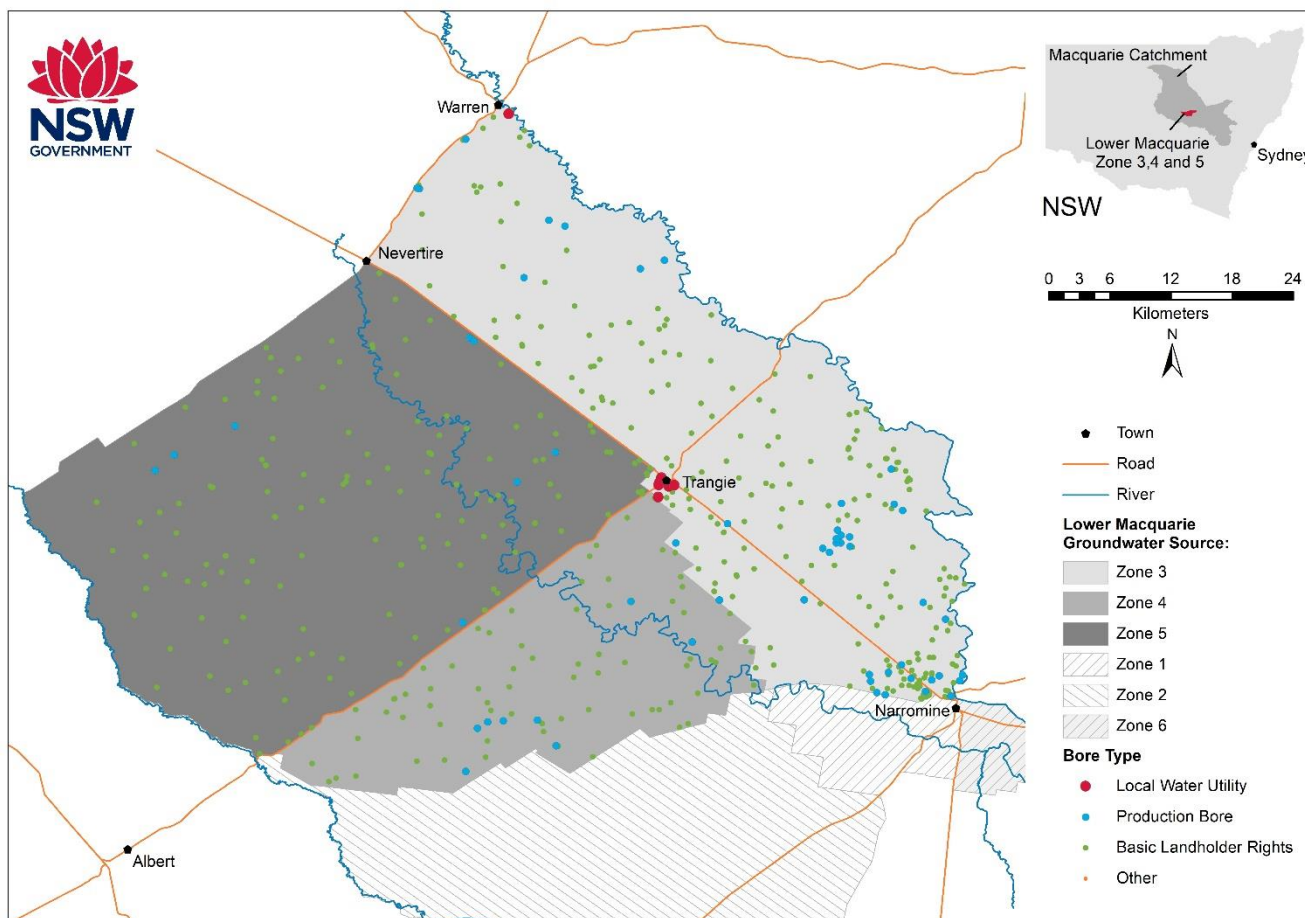


Figure 8: Lower Macquarie sandstone groundwater sources Zones 3, 4 & 5 water supply bores and distribution of extraction for period 2017/2018 to 2021/2022

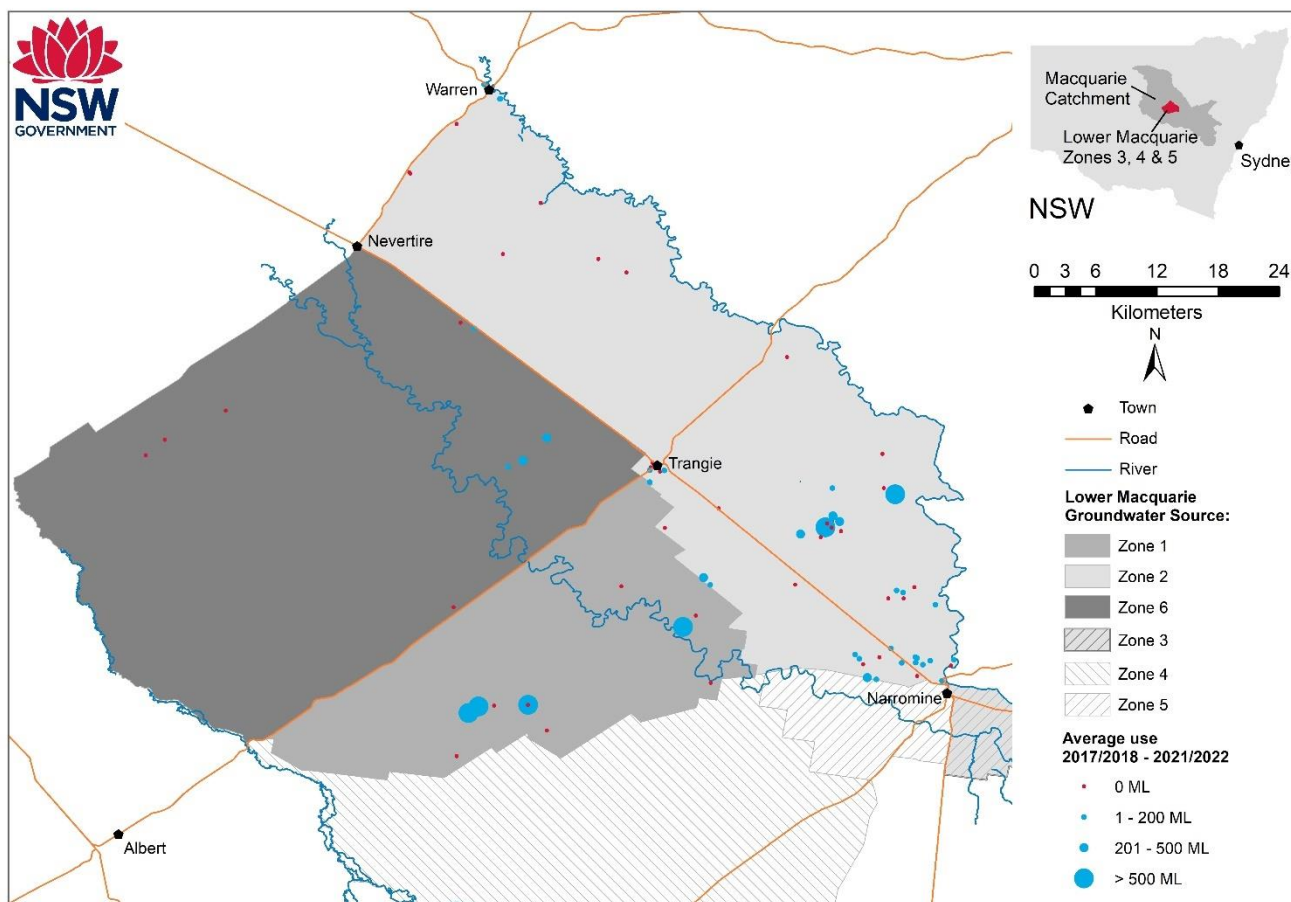


Figure 9: Lower Macquarie sandstone groundwater sources Zones 3, 4 & 5 monitoring bore sites

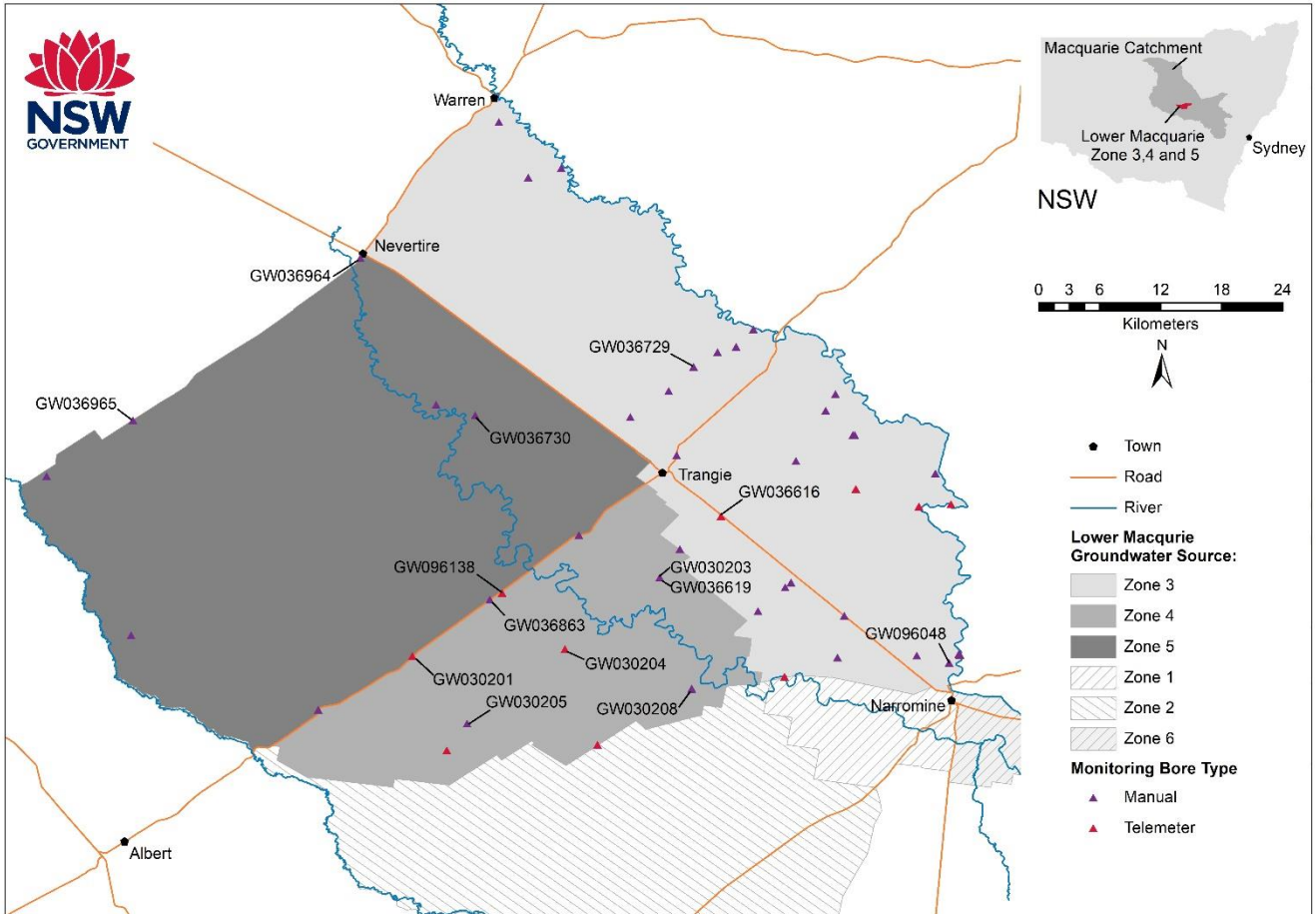


Figure 10: Hydrograph for monitoring bore GW096048 (Zone 3)

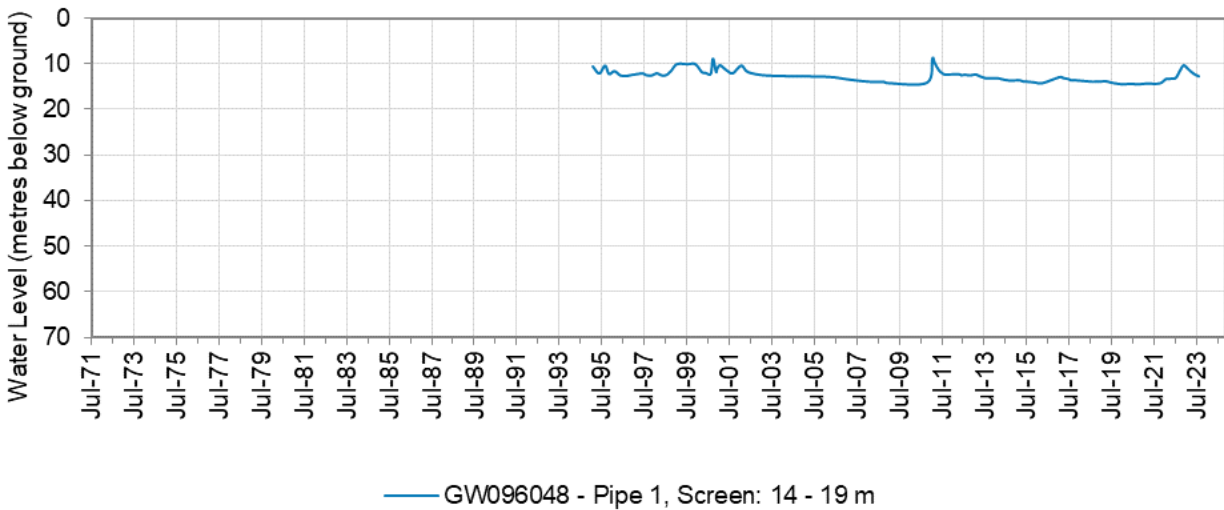


Figure 11: Hydrograph of monitoring bore GW036616 (Zone 3)

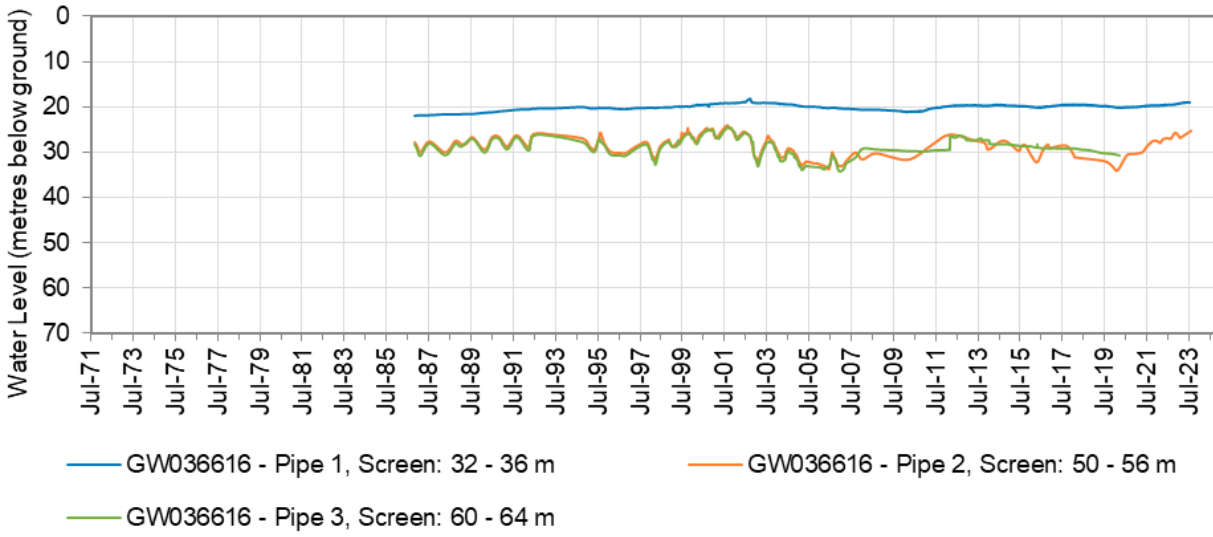


Figure 12: Hydrograph of monitoring bore GW036729 (Zone 3)

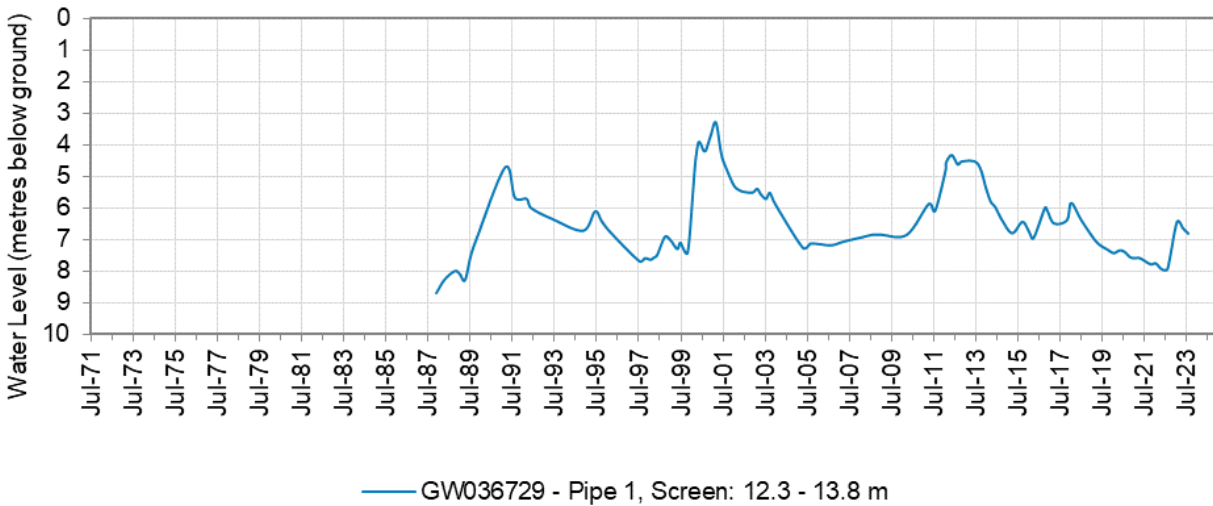


Figure 13: Hydrograph of monitoring bore GW030208 (Zone 4)

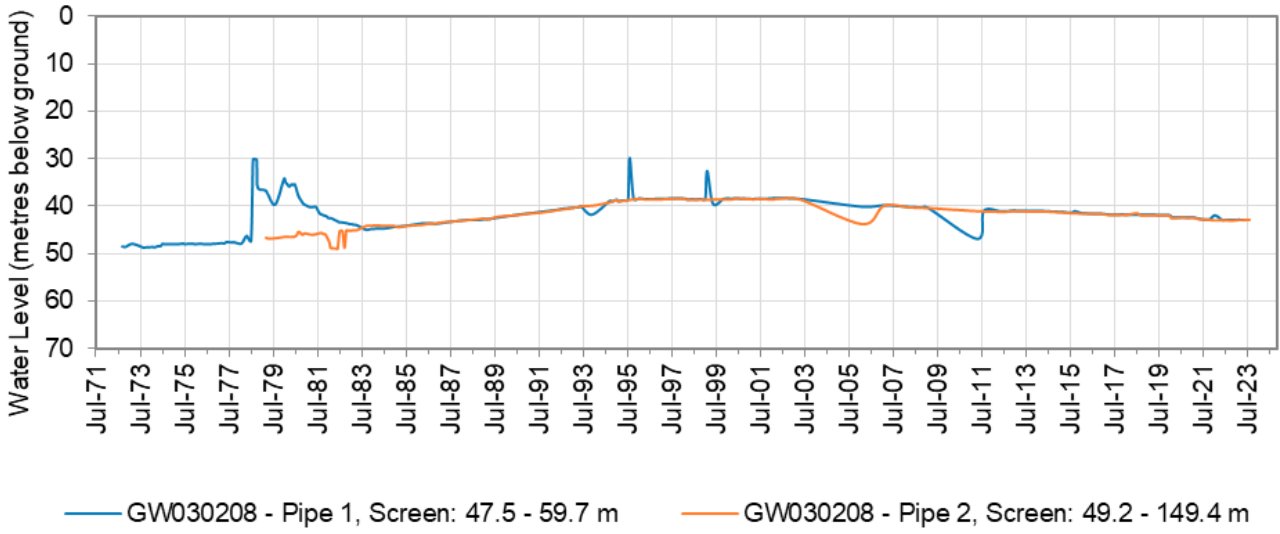


Figure 14: Hydrograph of monitoring bore GW030203 (Zone 4)

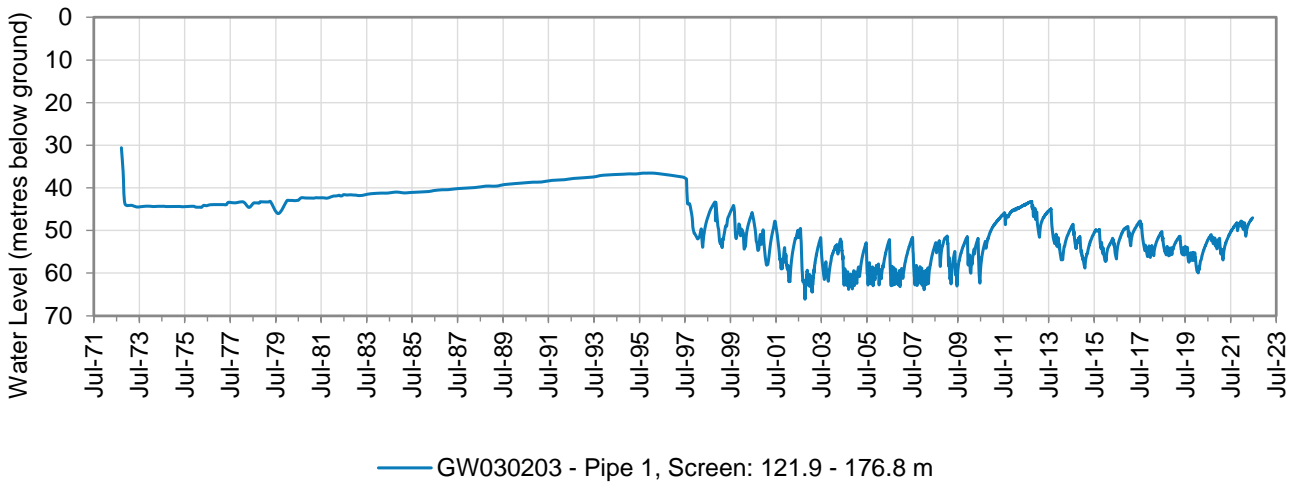


Figure 15: Hydrograph of monitoring bore GW036619 (Zone 4)

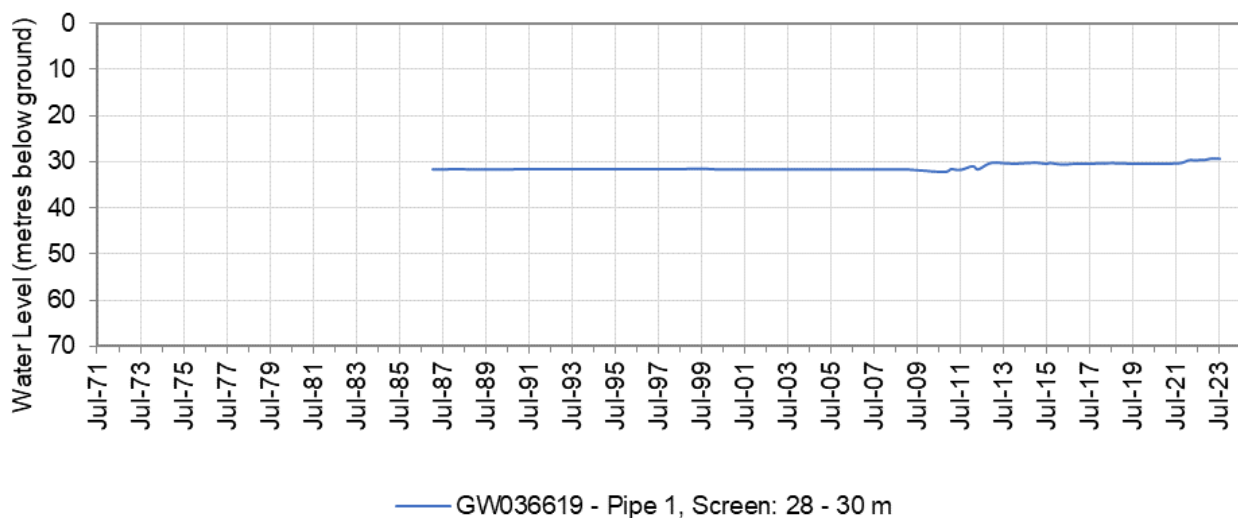


Figure 16: Hydrograph of monitoring bore GW030204 (Zone 4)

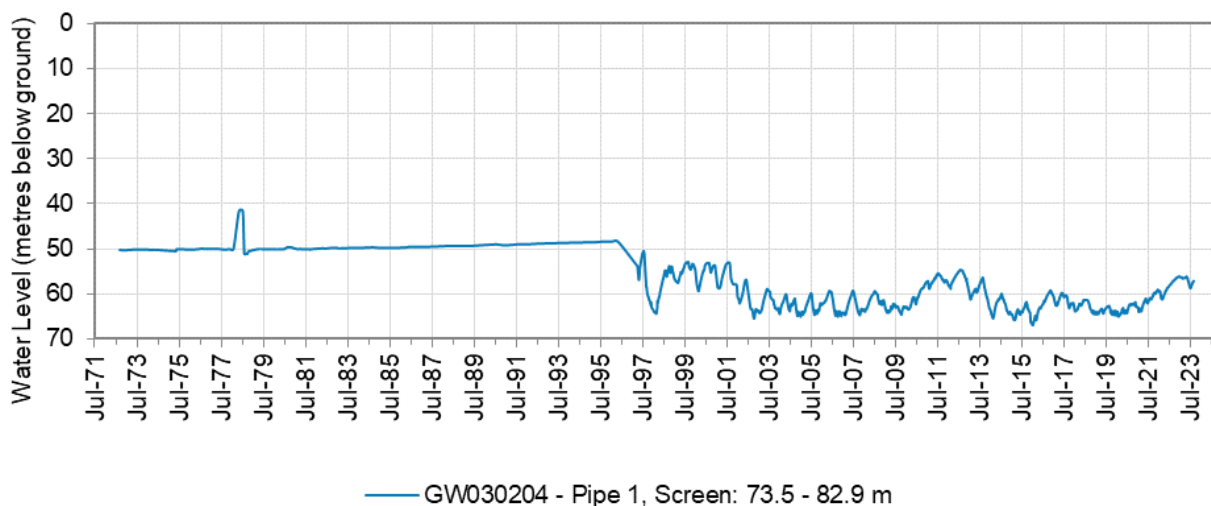


Figure 17: Hydrograph of monitoring bore GW030205 (Zone 4)

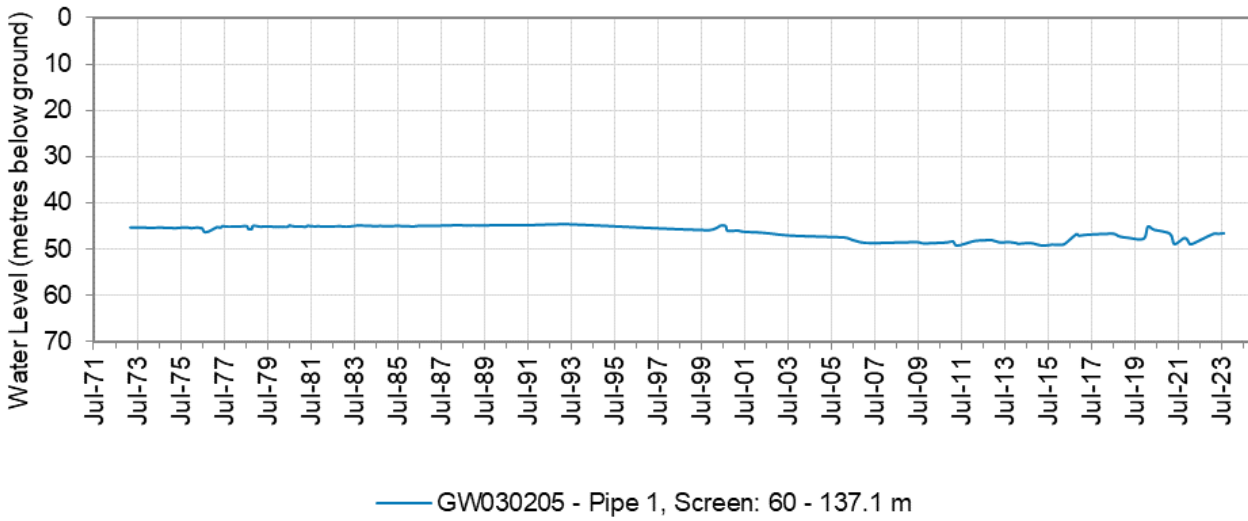


Figure 18: Hydrograph of monitoring bore GW096138 (Zone 4 / Zone 5 Boundary)

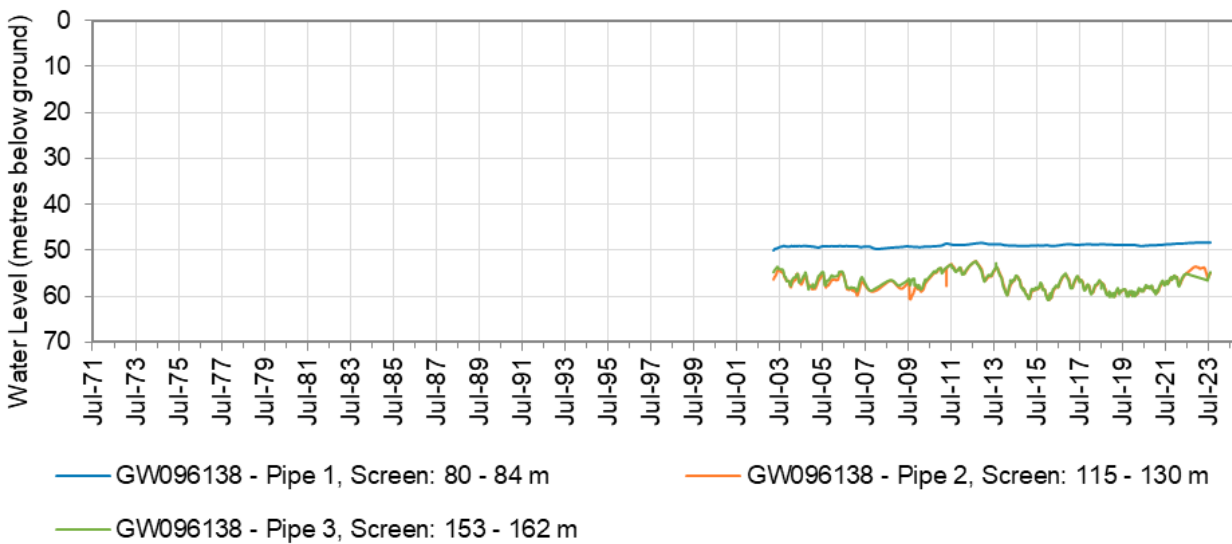


Figure 19: Hydrograph of monitoring bore GW036863 (Zone 4 / Zone 5 Boundary)

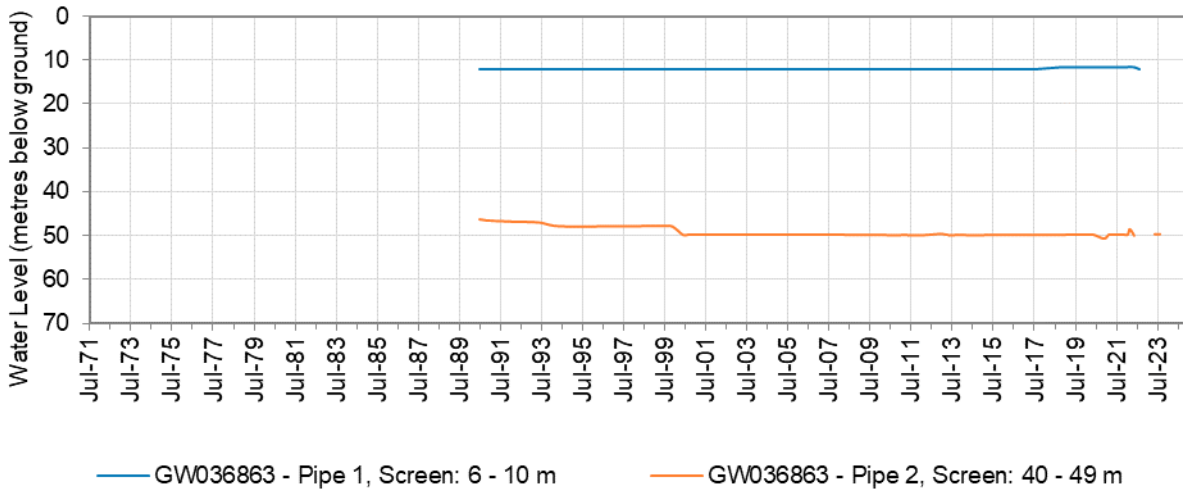


Figure 20: Hydrograph of monitoring bore GW030201 (Zone 4 / Zone 5 Boundary)

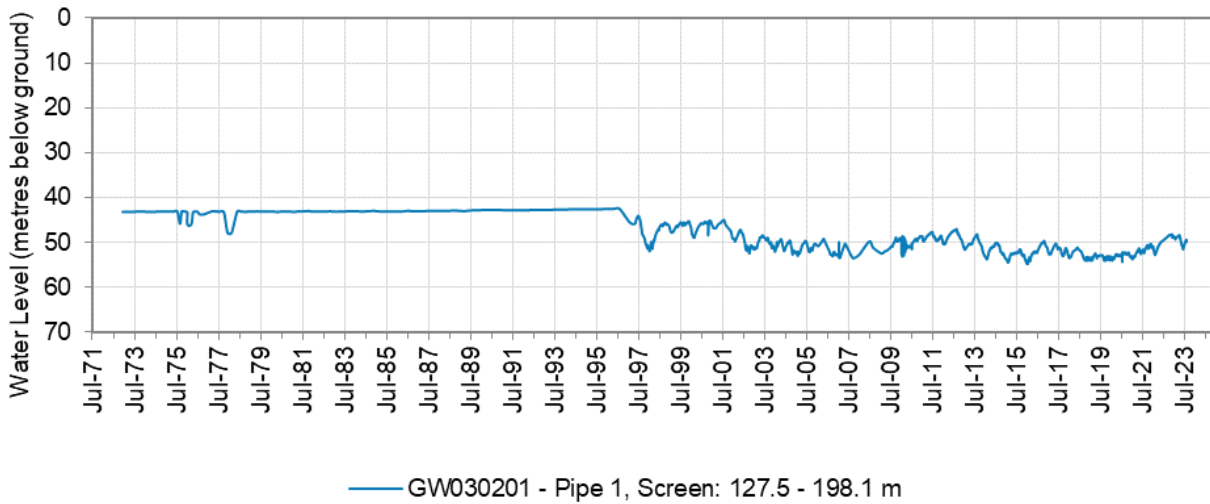


Figure 21: Hydrograph of monitoring bore GW036730 (Zone 5)

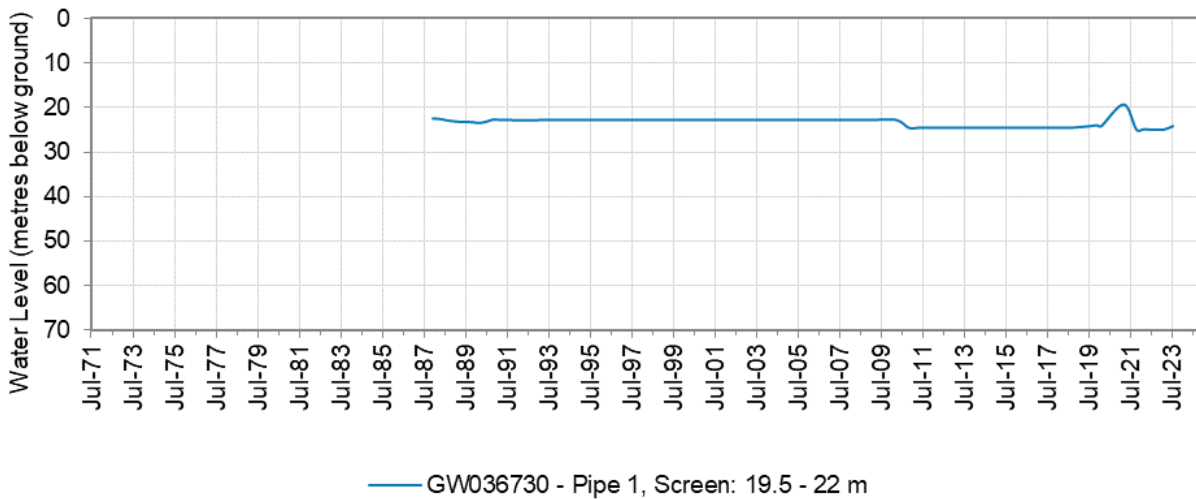


Figure 22: Hydrograph of monitoring bore GW036964 (Zone 5)

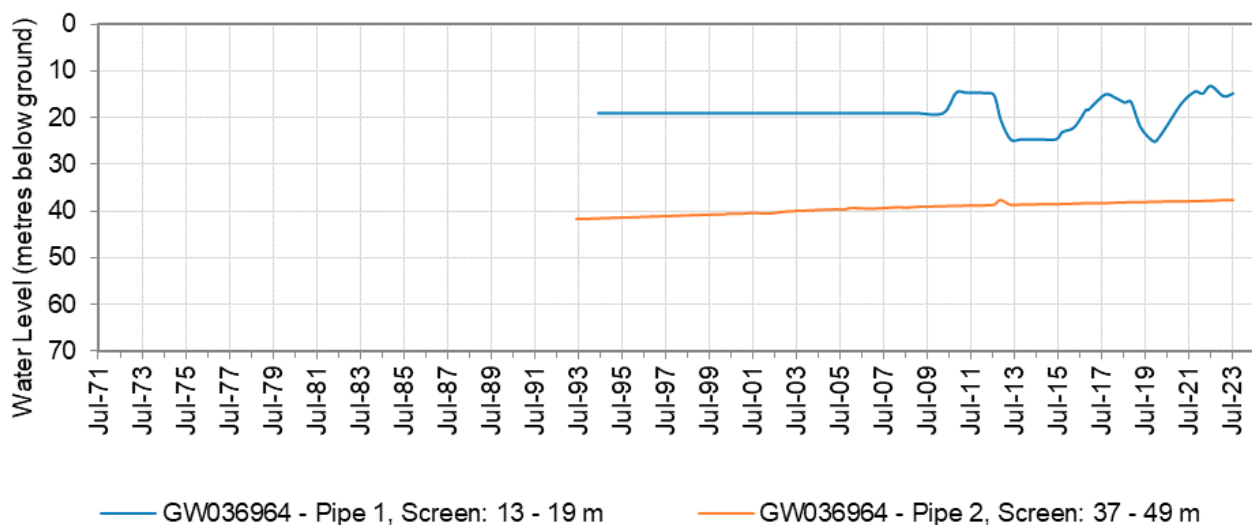


Figure 23: Hydrograph of monitoring bore GW036965 (Zone 5)

