Lower Macquarie sandstone groundwater sources

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 2020 to 30 June 2021. It will be updated regularly.

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 alluvial 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 Industry and Environment website at: www.industry.nsw.gov.au/water/plans-programs/water-sharing-plans/status/macquarie-castlereagh-region

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:

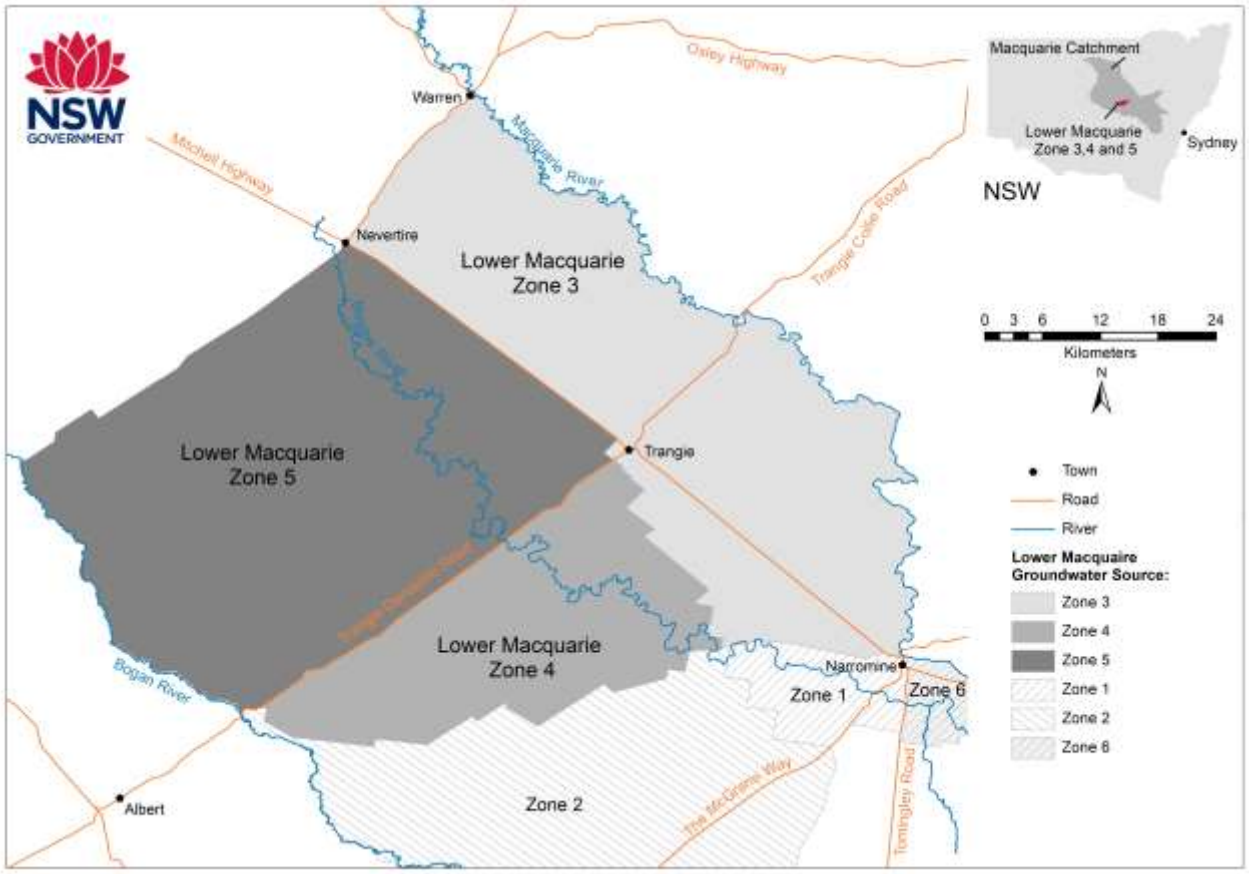
- Lower Macquarie Zone 3: 402 megalitres (ML).
- Lower Macquarie Zone 4: 226 ML.

- 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.

Figure 1: Location map



Groundwater access licences

Groundwater access licence share components for 2020 - 2021 are presented in **Table 1**.

Table 1: Lower Macquarie sandstone groundwater sources share component at 30 June 2021

Access Licence Category	Lower Macquarie Zone 3 Groundwater Source		Lower Macquarie Zone 4 Groundwater Source		Lower Macquarie Zone 5 Groundwater Source	
	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

[1]Megalitres/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 these water sources are defined in the water sharing plan and listed in **Table 2.**

Table 2: Extraction Limit for 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 (the assessment period) 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 total 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: www.industry.nsw.gov.au/water/allocations-availability/tracking-groundwater

For each inland groundwater source, the 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 credited to an access licence account in a water year is controlled by the available water determinations 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 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), minus any allocation transferred out. This means that metered extraction, plus transfers out, can't exceed 144% of the of share component, unless water is transferred in.

Total account water is displayed in **Figures 2** to **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 graphs.

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 groundwater sources on 1 July 2021 is summarised in **Table 4**.

Table 4: Access licence account information

	Lower Macquarie Zone 3 Groundwater Source	Lower Macquarie Zone 4 Groundwater Source	Lower Macquarie Zone 5 Groundwater Source
Carryover In (ML)	5,124	1,882	1,536
Available water determination (ML)	3,614	5,103	2,477
Total water in account (ML)	13,738	6,985	4,013
Water available for use (ML)	12,250	6,487	3,566

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

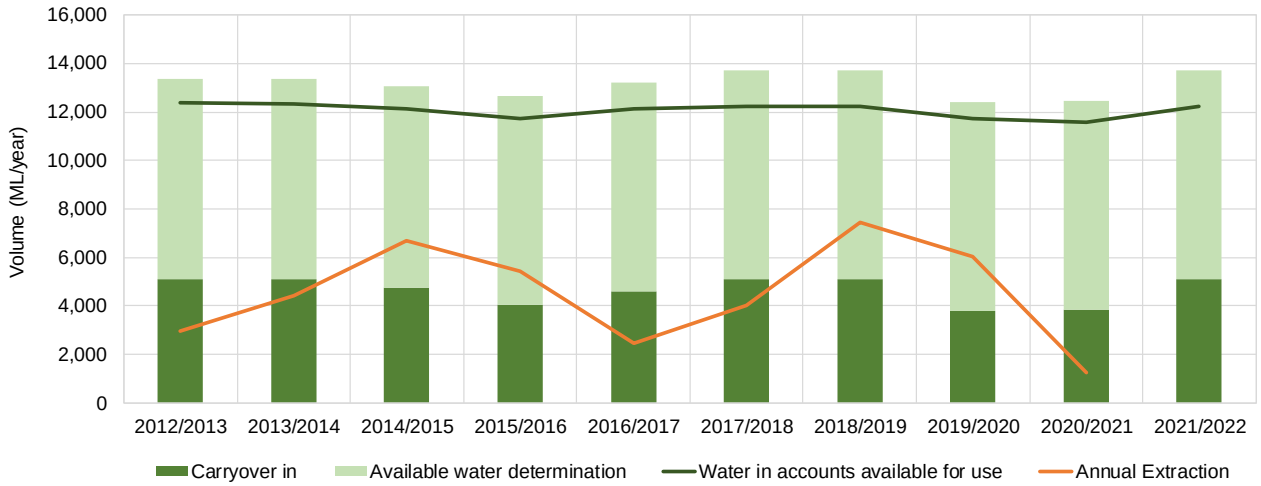


Figure 3: Account water availability and usage summary for Lower Macquarie Zone 4 Groundwater Source

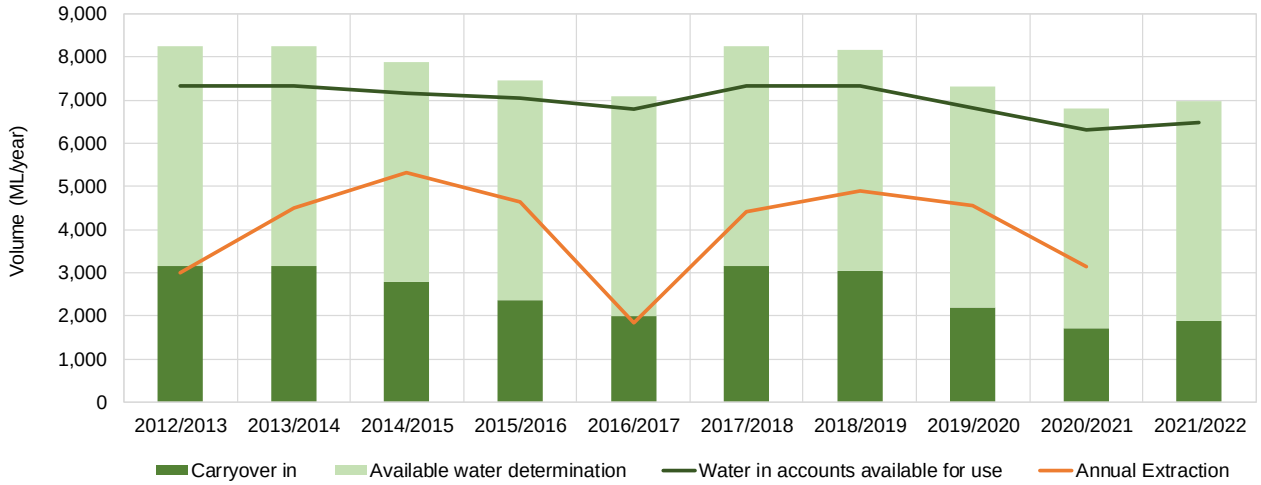
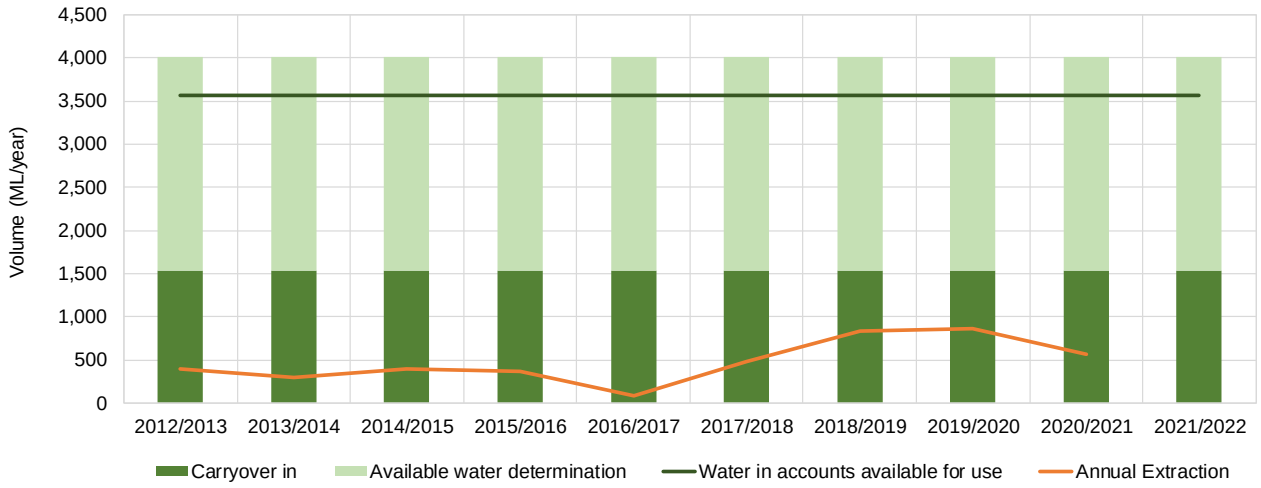


Figure 4: Account water availability and usage summary for Lower Macquarie Zone 5 Groundwater Source



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 source.

Allocation assignments (temporary trade)

Trading statistics for the Lower Macquarie Zone 3 Groundwater Source are illustrated in **Figure 5** and Lower Macquarie Zone 4 Groundwater Source in **Figure 6**, these graphs exclude temporary trades for less than $1 per megalitre.

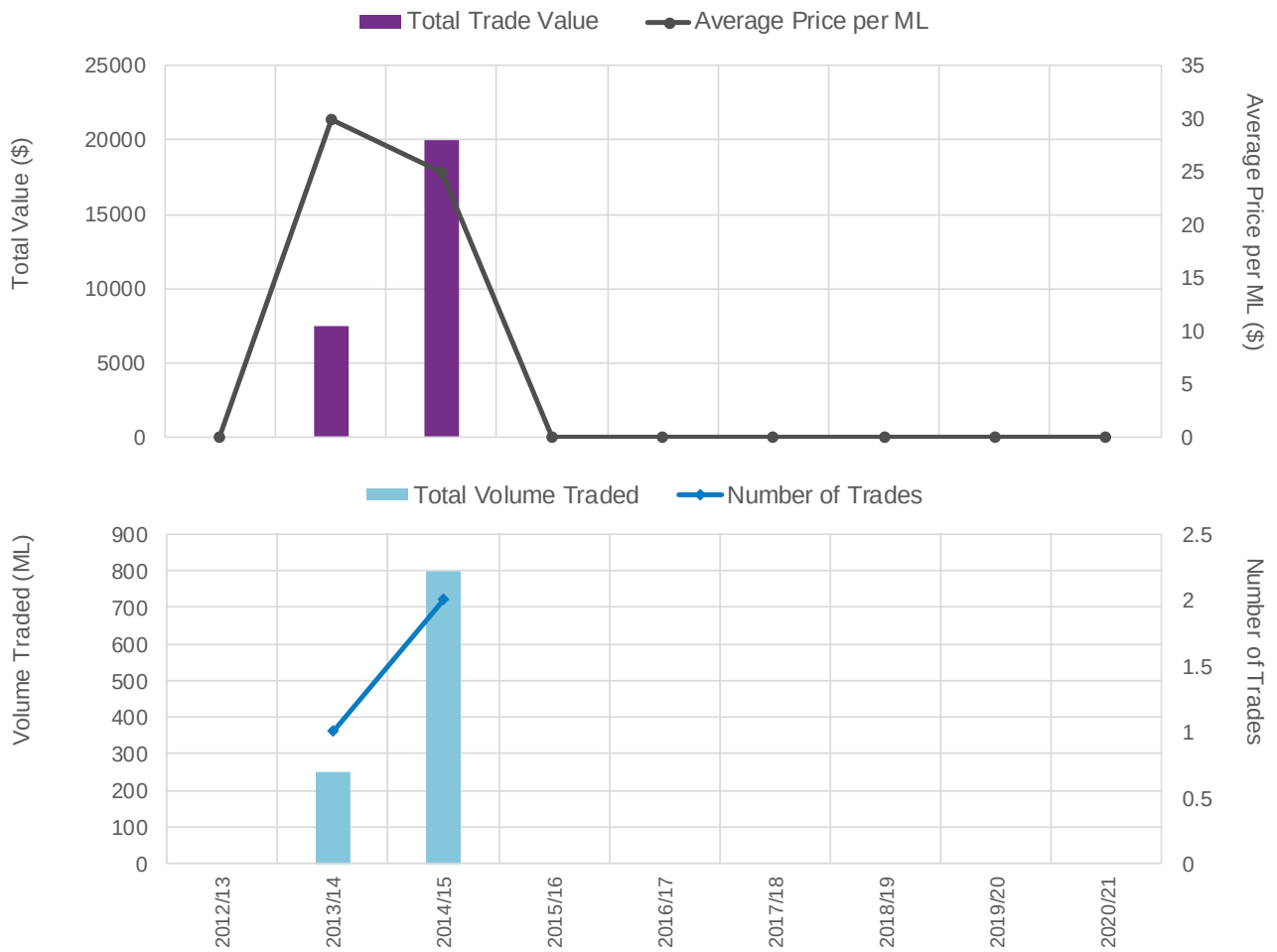
There have been limited temporary trades in the Lower Macquarie Zones 3 and 4 since the water sharing plan was implemented in 2012 as shown in **Figures 5** and **6**.

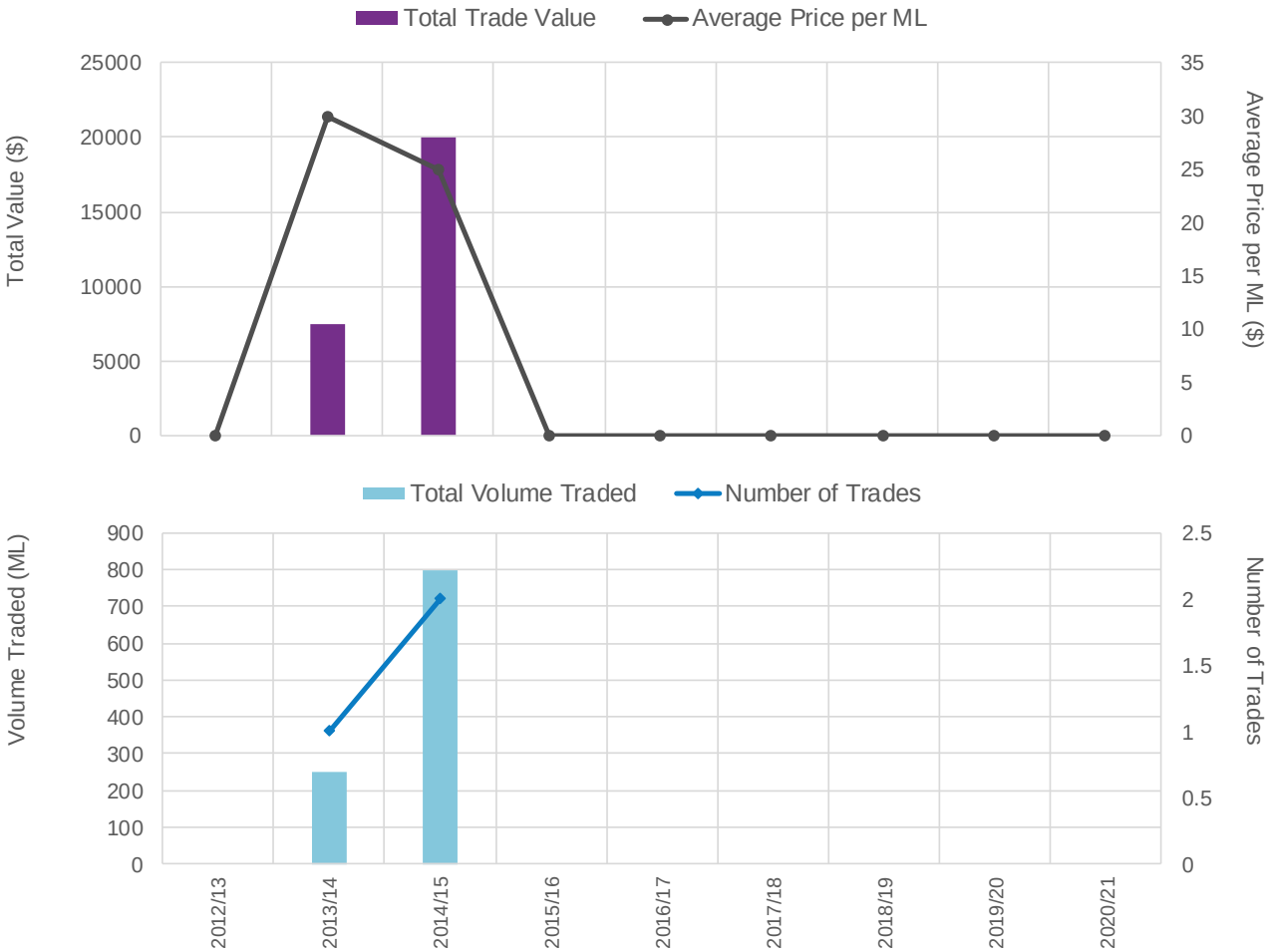
No allocation assignments have been recorded for the Lower Macquarie Zone 5 Groundwater Source.

Further information on water licences, approvals, water trade, 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 664 registered bores across the Lower Macquarie sandstone groundwater sources (**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: Number of licensed water supply bores in the Lower Macquarie sandstone groundwater sources (at June 2021)

Water Source	Registered Bore Type		
	Basic Landholder Rights	Production	Local Water Utility
Lower Macquarie Zone 3 Groundwater Source	260	49	11
Lower Macquarie Zone 4 Groundwater Source	136	11	0
Lower Macquarie Zone 5 Groundwater Source	187	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 **Figures 10** to **23**.

Data for the monitored bores, as well as private bore information, can be obtained from the WaterNSW real time data portal (realtimedata.waternsw.com.au/). It includes data for 13 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 source registered bores

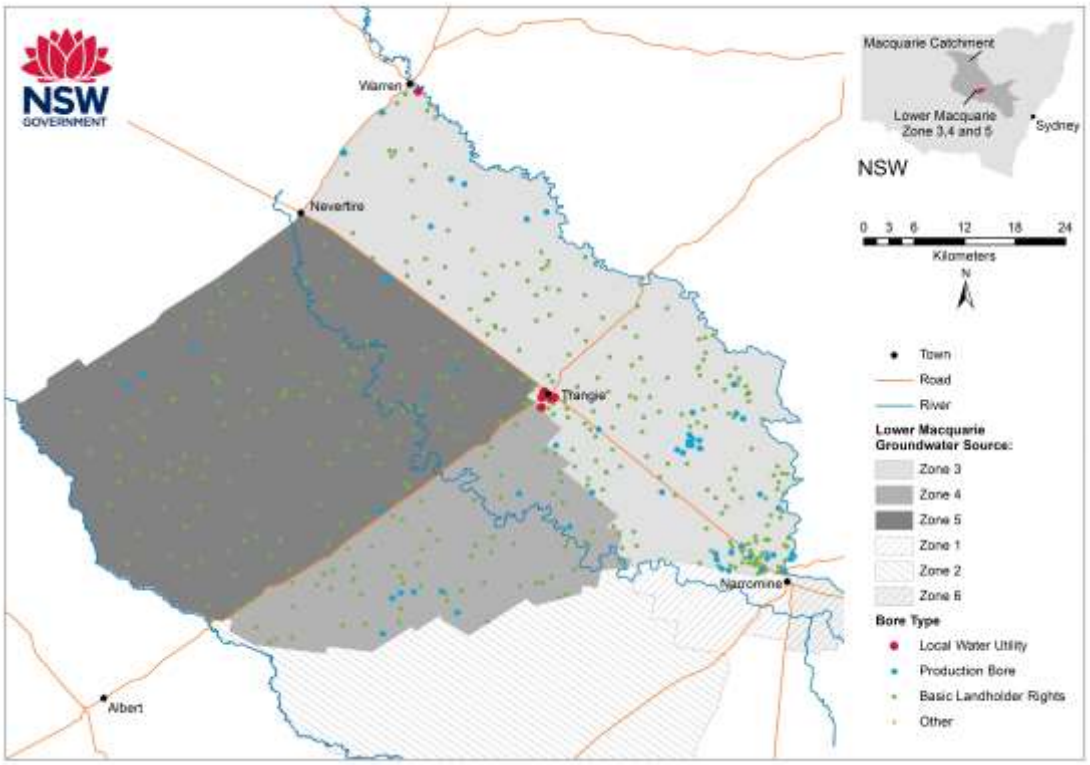


Figure 8: Lower Macquarie sandstone groundwater sources water supply bores and distribution of extraction

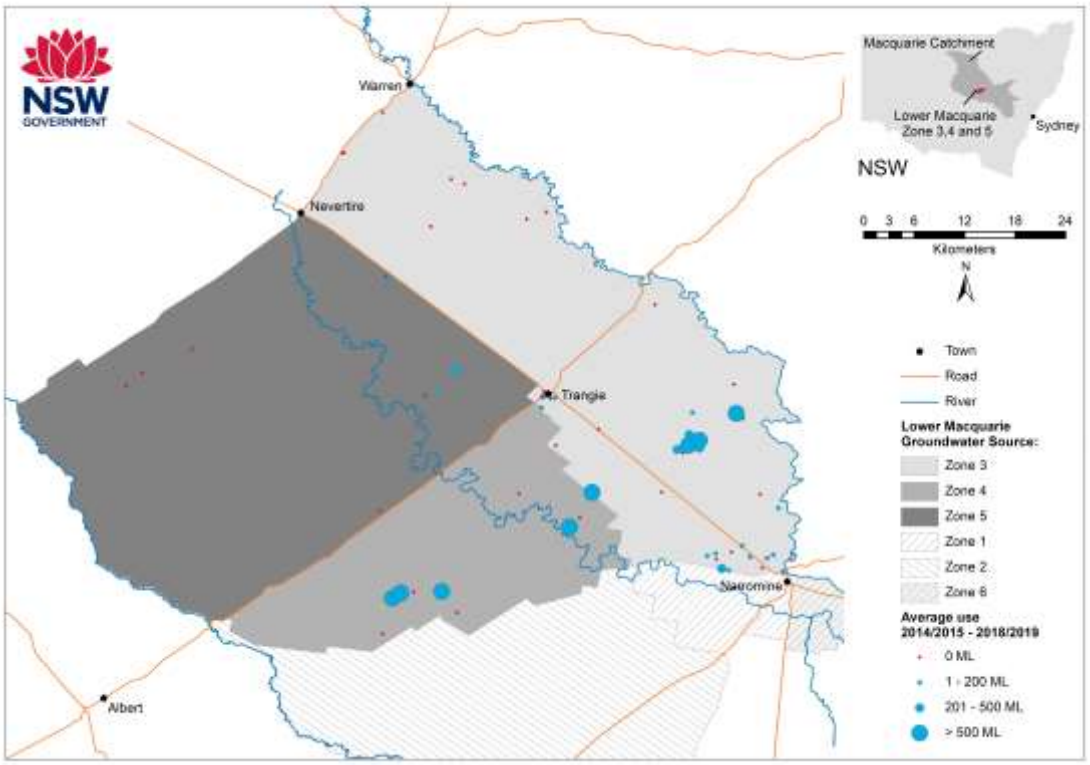


Figure 9: Lower Macquarie sandstone groundwater sources monitoring bore sites

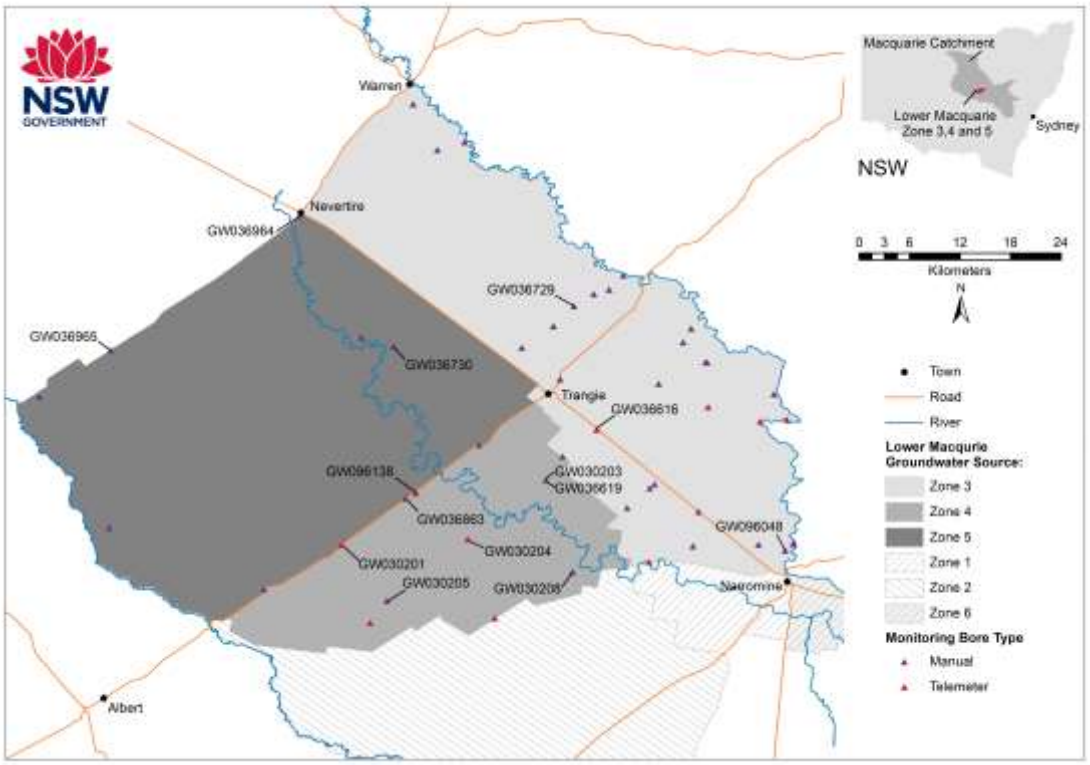


Figure 10: Hydrograph for monitoring bore GW096048 (Zone 3)

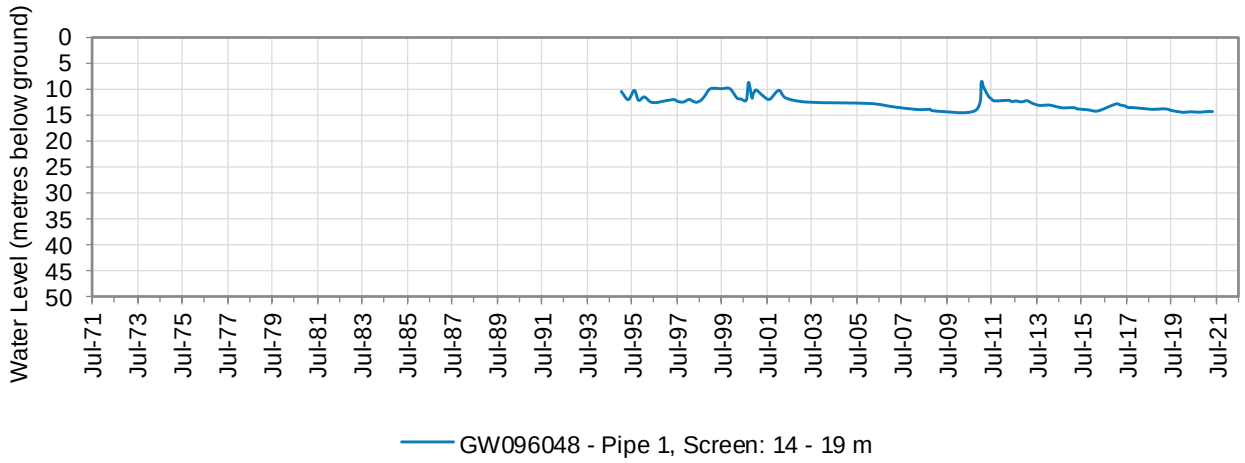


Figure 11: Hydrograph for monitoring bore GW036616 (Zone 3)

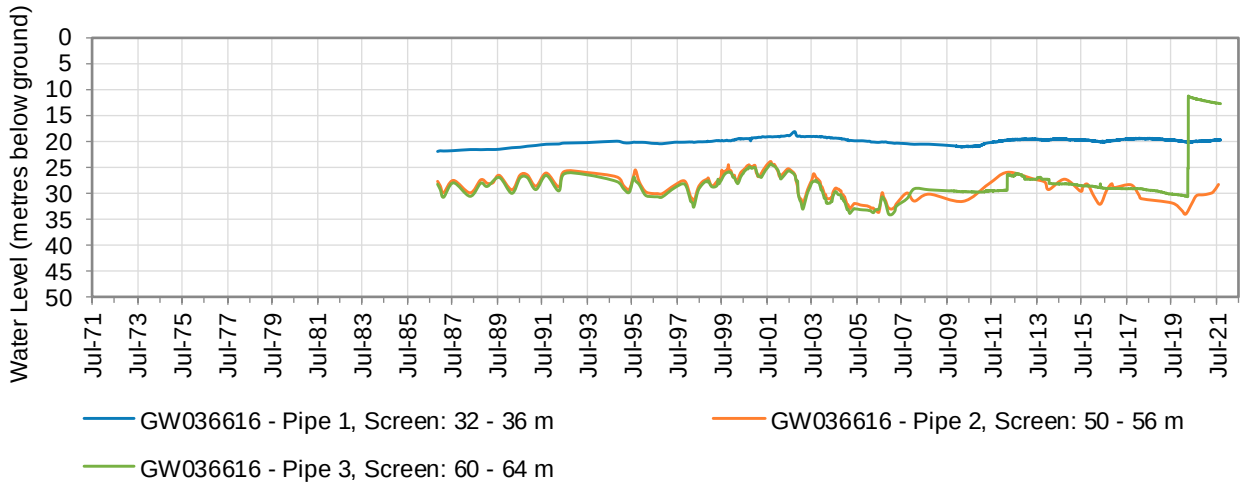


Figure 12: Hydrograph for monitoring bore GW036729 (Zone 3)

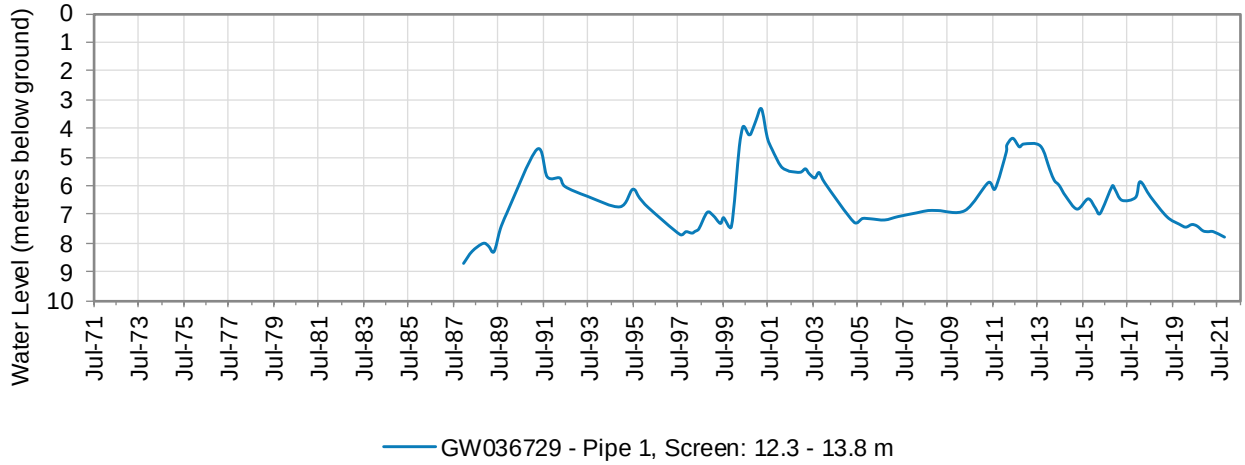


Figure 13: Hydrograph for monitoring bore GW030208 (Zone 4)

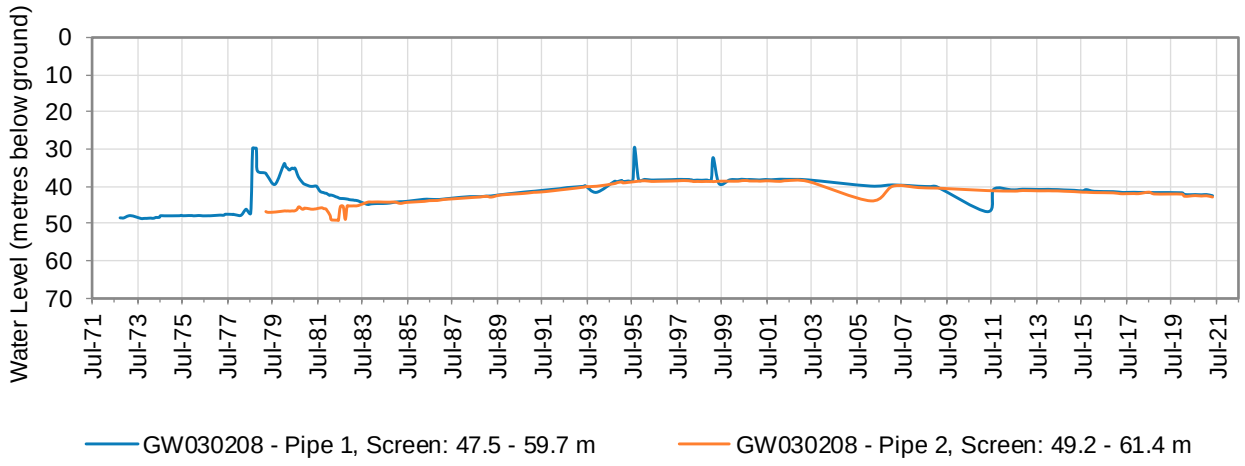


Figure 14: Hydrograph for monitoring bore GW030203 (Zone 4)

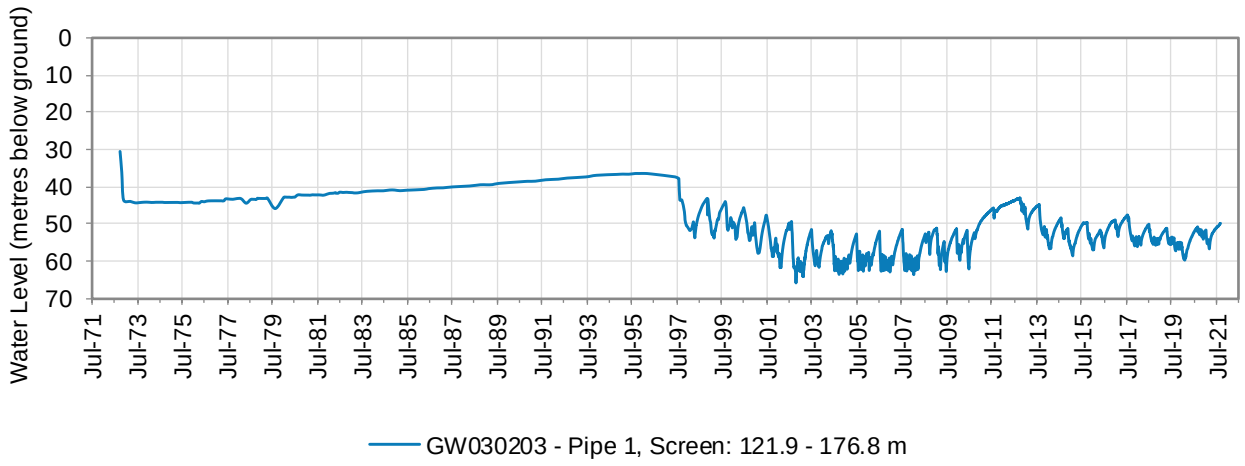


Figure 15: Hydrograph for monitoring bore GW036619 (Zone 4)

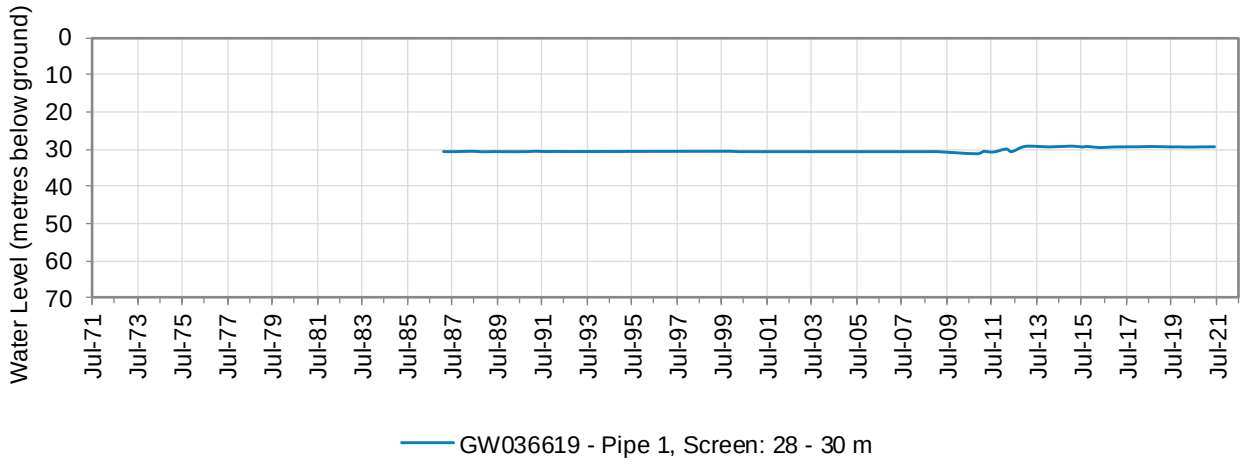


Figure 16: Hydrograph for monitoring bore GW030204 (Zone 4)

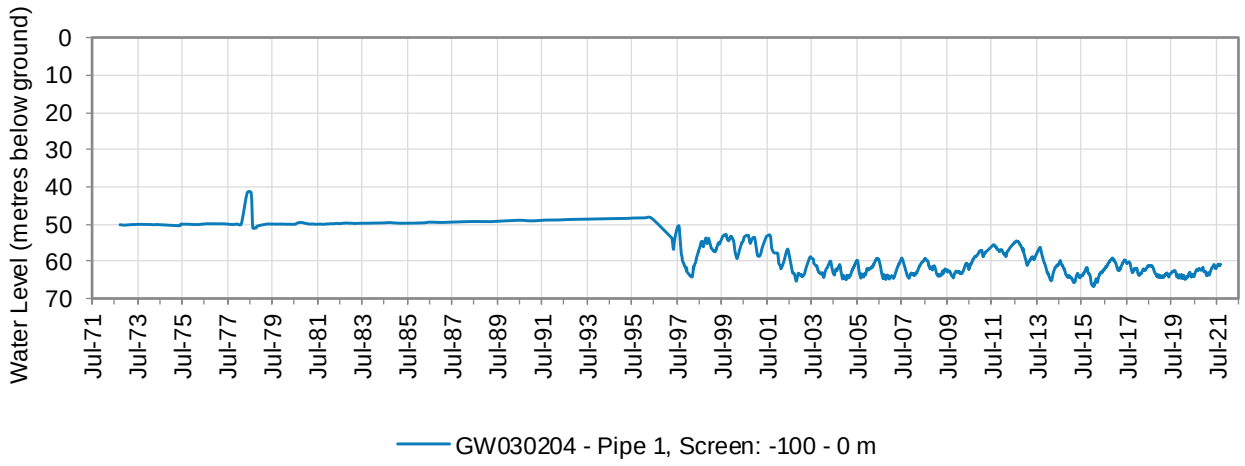


Figure 17: Hydrograph for monitoring bore GW030205 (Zone 4)

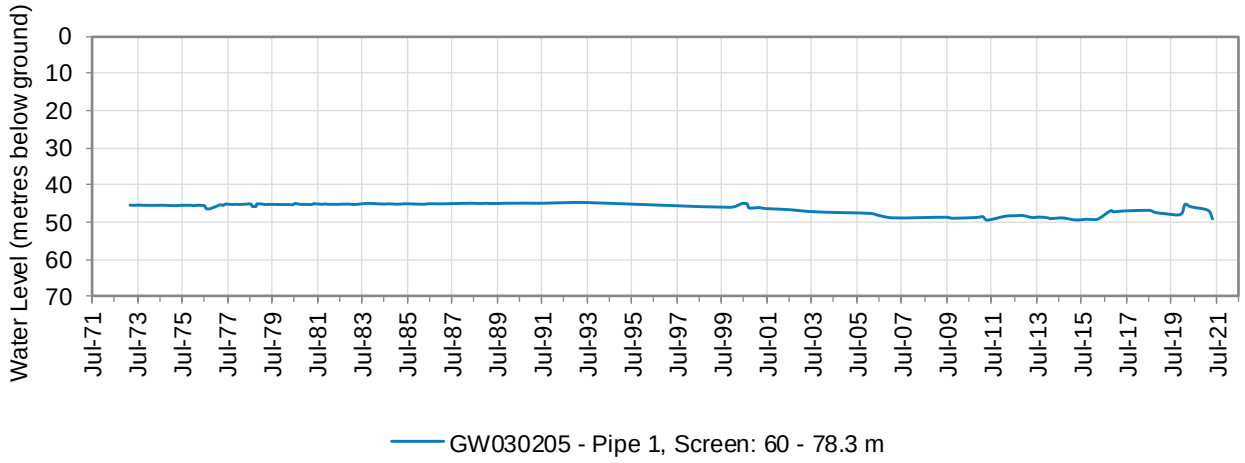


Figure 18: Hydrograph for monitoring bore GW096138 (Zone 4/Zone 5 boundary)

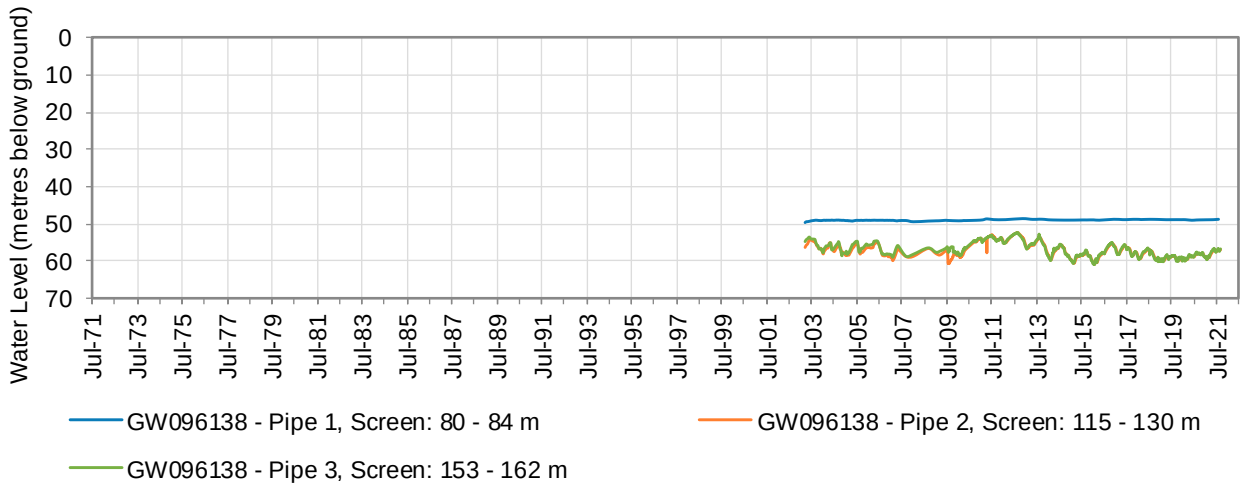


Figure 19: Hydrograph for monitoring bore GW036863 (Zone 4/Zone 5 boundary)

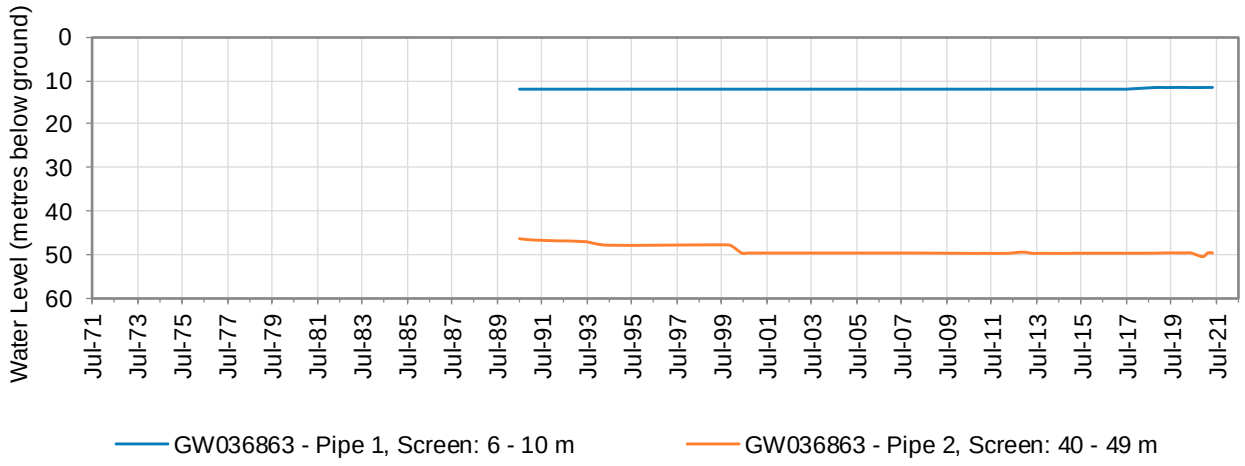


Figure 20: Hydrograph for monitoring bore GW030201 (Zone 4/Zone 5 boundary)

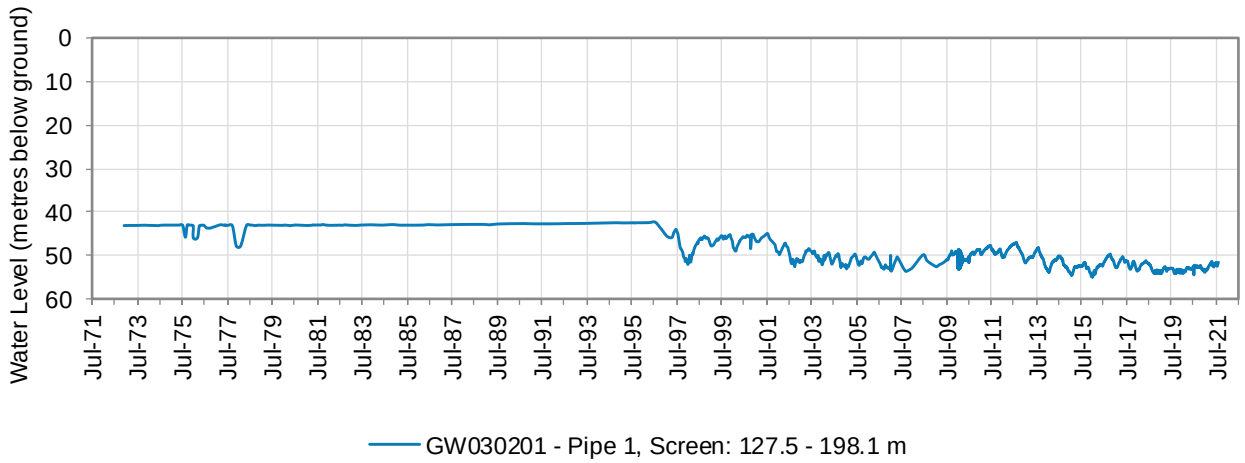


Figure 21: Hydrograph for monitoring bore GW036730 (Zone 5)

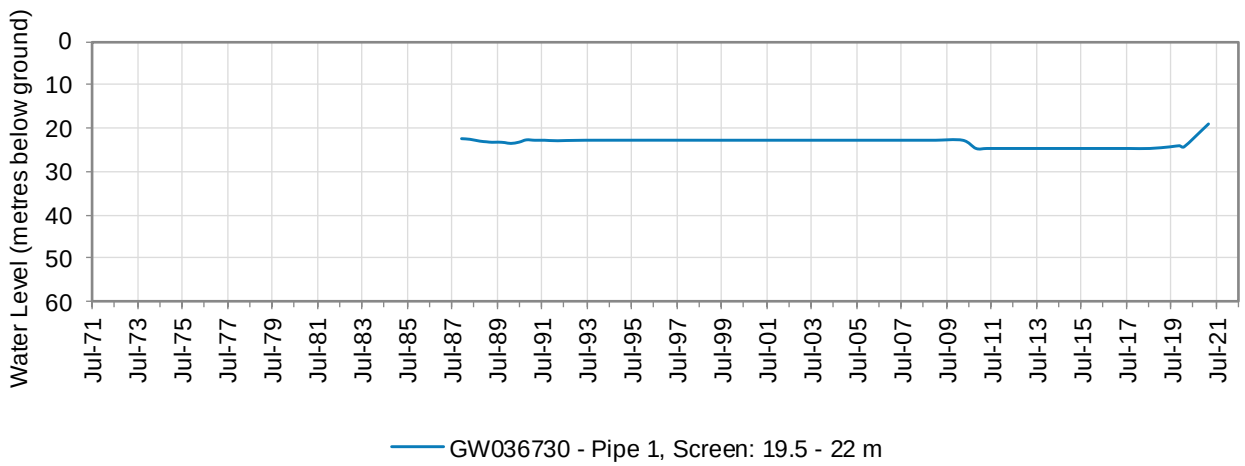


Figure 22: Hydrograph for monitoring bore GW036964 (Zone 5)

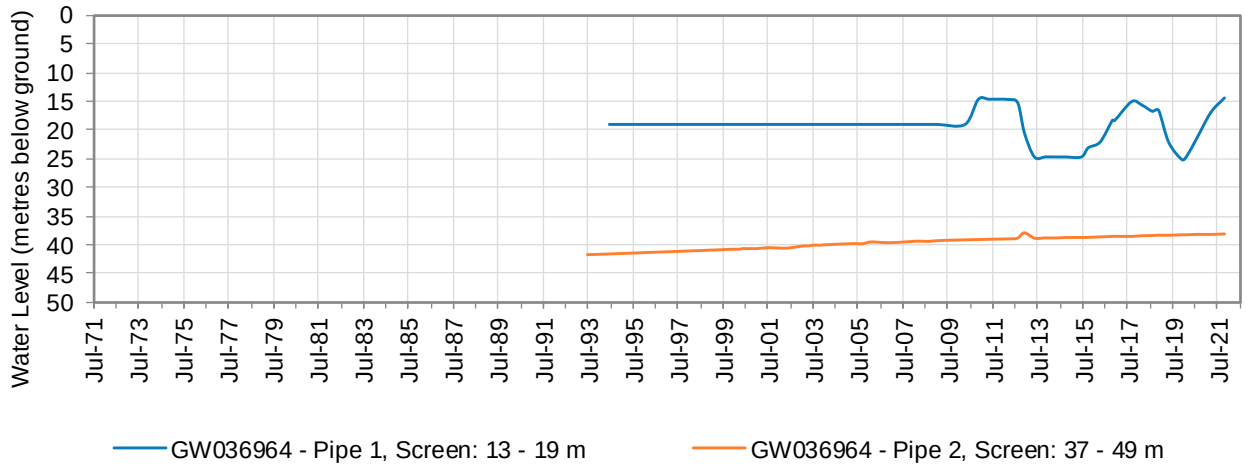


Figure 23: Hydrograph for monitoring bore GW036965 (Zone 5)