



Murray Darling catchments – surface water and storage monitoring network review

Hydrometric Network Review

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The Department of Planning, Industry and Environment acknowledges the Traditional Owners and Custodians of the land on which we live and work and pays respect to Elders past, present and future.

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Executive Summary

Surface water monitoring networks in Murray Darling Basin (MDB) catchments within New South Wales were reviewed to aid the NSW Department of Planning, Industry and Environment, Natural Resources Access Regulator and Water NSW to design a network that can effectively assess and manage the surface water resources. The network will be designed with input from the Murray Darling Basin Authority.

This review of sites and data requirements was completed through consultation with both internal and external Subject Matter Experts (SME). The review found the gauging station, storage, water quality and rainfall monitoring networks are effective given the need for prudence and efficiency in operation.

The review was completed in three tranches:

1. Surface Water Flow and Level - Stream Flow and Storage
2. Surface Water Quality - Stream Flow and Storage
3. Meteorological - Rainfall and other weather parameters

The review of each tranche was conducted separately as follows:

- Part 1: Review the existing drivers for Surface Water Information.
- Part 2: Assess the current network of sites for information reliability and its ability to meet current needs, and
- Part 3: Create/design an optimum network, in terms of the location and information types, to assess the water resources of the NSW catchments within the Murray Darling Basin.

The findings of each of the tranches are summarised briefly below.

Flow and Level – Stream Flow and Storage

The review found that 453 of the 500 Stream Flow sites could be retained in their current location and configuration. The review also recommended consideration of 25 new flow sites, 3 relocations to more suitable sites and 8 sites for added equipment-parameters including telemetry.

The review did not recommend changes to Water Storage sites or the parameters being monitored at these sites. Dependant on cellular signal coverage or alternative technology, 5 sites were recommended for a telemetry upgrade.

Water Quality- Stream and Storage

This tranche consisted of a review of the surface water quality monitoring network. This included time series or near to real time monitoring and discrete water quality sampling sites at stream flow gauging stations and water storages in MDB catchments within New South Wales. This was completed to assure the department and WaterNSW that the network is capable of effectively assessing, reporting, and managing the water quality in the Basin.

There are 190 water quality monitoring sites with in-situ sensors at gauging stations with parameters varying from water temperature only with Level/Velocity sensors to sites with water temperature, Electrical Conductivity (EC), Dissolved Oxygen (DO) and turbidity sensors.

Twenty-four sites were identified for potential upgrades. Thirty-nine discontinued gauging stations and/or new sites which were not initially included in the review were also ranked for potential upgrades by SME. This included the re-instatement of level and flow gauging stations to support salinity and other water quality programs. While the levels of importance for each parameter varied between the SMEs assessments, none of the time series water quality monitoring sites were ranked for potential downgrade.

The discrete sampling and laboratory analysis of streams and storages routinely takes place at around 256 MDB sites where water quality is monitored. These are locations where water is used for recreation, public access, stock, domestic, irrigation and/or drinking water.

Rural rivers are monitored to characterise water quality and quantity. Physical and chemical properties are analysed monthly as part of the Surface Water Assessment and Monitoring Program (SWAMP). Algal analysis is conducted monthly as part of the Regional Algal Coordinating Committee program (RACP). Water temperatures are monitored for cold water pollution at selected rivers with established monitoring sites in rural rivers downstream of selected storages.

Six sites are sampled by Water NSW for MDBA and 22 sampled for Dumaresq Barwon Border Rivers Commission (DBBRC). Two existing discrete water quality sampling sites were ranked as potential upgrades or improved location more representative of the location with one new site recommended. Eight of the routinely sampled sites were ranked for potential downgrades.

Meteorological

The Meteorological review included direct feedback responses for this tranche by SMEs with added rainfall needs also noted during the Stream and Storage Flow and Level review. The Bureau of Meteorology (BoM) network was not reviewed.

There were 110 meteorological sites, mostly rainfall, included in the overall meteorological review. Eighty-three of these gauges were located at hydrometric river gauging stations and two at storages, seven were autonomous rain gauges and four were Automatic Weather Stations (AWS) installed initially for agricultural research.

Ninety-six (96) of the sites are telemetered as part of the WaterNSW hydrometric network and available on the Corporate Hydstra database. Of these, two were at river gauging stations with rainfall data telemetered via SCADA. Data from these SCADA sites was not available for review, but the sites are considered to be essential.

Twelve Automatic Weather Stations (AWS) are operated by WaterNSW and located at water storages with data telemetered via SCADA. Data was not available for review; however, the sites are ranked as critical by River Operations.

The review identified that there were twenty-one potential upgrades to rain sites. Of these, fifteen are needed at existing river gauging stations and six at new sites including one proposed for a new water level monitoring site. The potential upgrade numbers exclude the two sites where rainfall data is imported from the Bureau of Meteorology (BoM).

Overall, the current networks meet the needs of the major NSW stakeholders. Some modifications to the placement of sites, infrastructure and its operation are recommended.

Context

Overview

The Murray Darling Basin (MDB) is divided into Northern Basin and Southern Basin. It covers 14% of mainland Australia, 75% of New South Wales, more than 50% of Victoria, 15% of Queensland, 8% of South Australia and all of the Australian Capital Territory.

Figure 1 - Murray Darling Basin - Source MDBA website



Management of water within the NSW part of the Basin has several major Government stakeholders including the Murray Darling Basin Authority (MDBA), Department of Planning Industry and Environment (DPIE), WaterNSW and Natural Resource Access Regulator (NRAR).

Water Sharing plans have been developed under the *Water Management Act 2000* to sustainably manage and allocate water resources in New South Wales. These Water Sharing Plans detail the significant issues within the geographic areas that drive many of the surface water monitoring activities.

This hydrometric review has been undertaken to help realise delivery of outcomes identified by the *Murray–Darling Basin Compliance Compact* (the ‘Compact’) in which the Basin governments have committed to under the five key themes of:

- compliance and enforcement frameworks
- transparency and accountability
- metering and measurement
- finalising water resource plans, and
- protecting environmental water

Ultimately, the findings of this report should lead to an improvement in the robustness of the water monitoring network which includes the broader cooperation of stakeholders involved.

The Compact identifies that Basin governments have collectively agreed to a range of actions as part of improving their compliance and enforcement arrangements this review focuses on the “*public assurance over the quality and coverage of water information for compliance and enforcement, including from hydrometric networks and hydrologic models...*”. The findings of this review, which includes the broader cooperation of stakeholders involved, should lead to an improvement in the robustness of the surface water monitoring network.

Spatial Grouping of Basin Catchments

The MDB contains a large and complex river system. To make managing it more workable it has been sub divided into different areas based on stream catchment boundaries. Depending on which jurisdiction and/or task being undertaken, the relevant spatial catchment boundary can vary.

Figure 2 - MDB Catchments – Source MDBA website

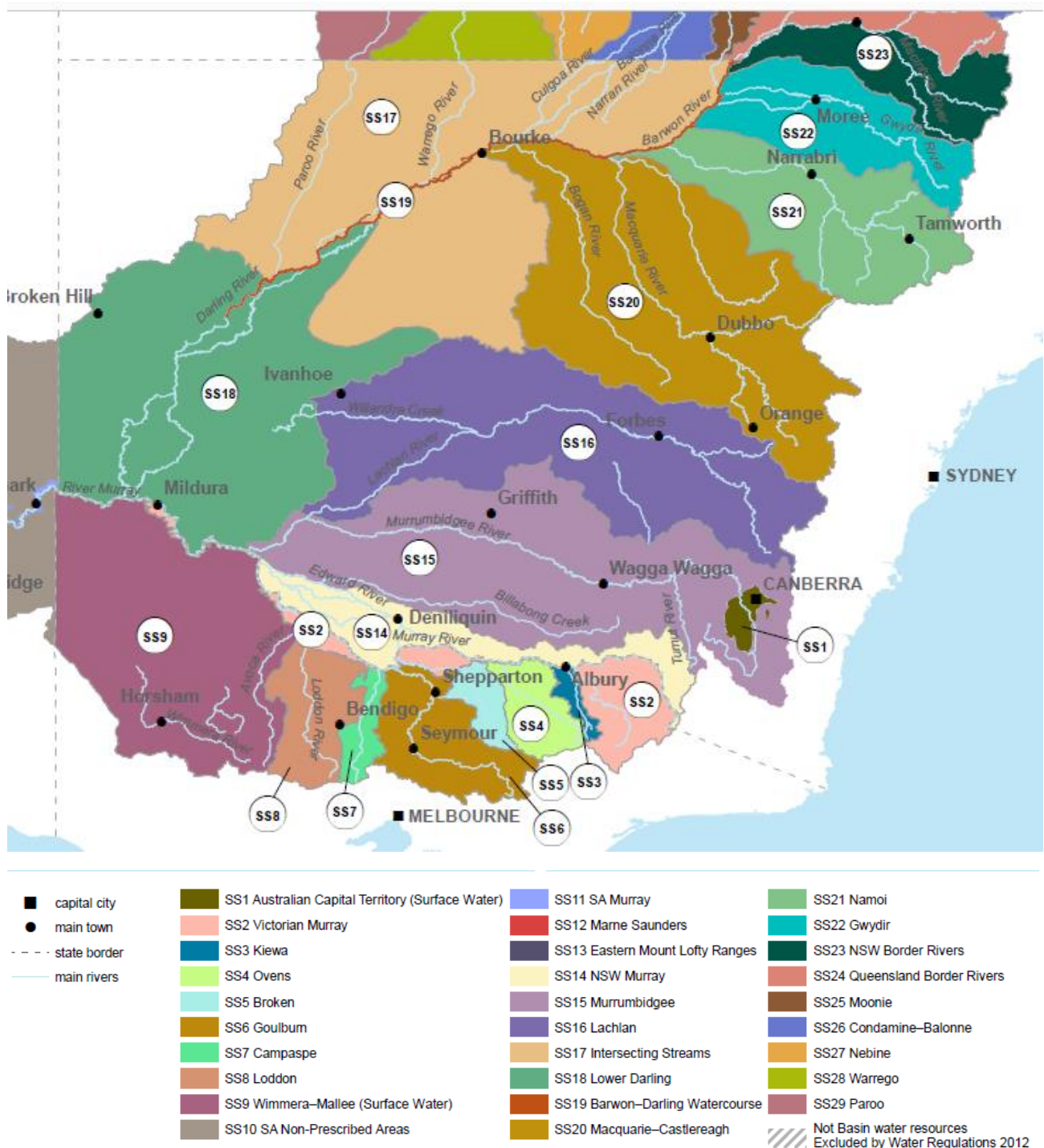


In NSW, the SMEs view the Basin in diverse ways and scales. They include the following different, functional catchment boundaries:

- Sustainable Diversion Limit reporting areas
- NSW Water Sharing Plan areas
- The former Australian Water Resources Council (AWRC) River Basin numbering and naming system

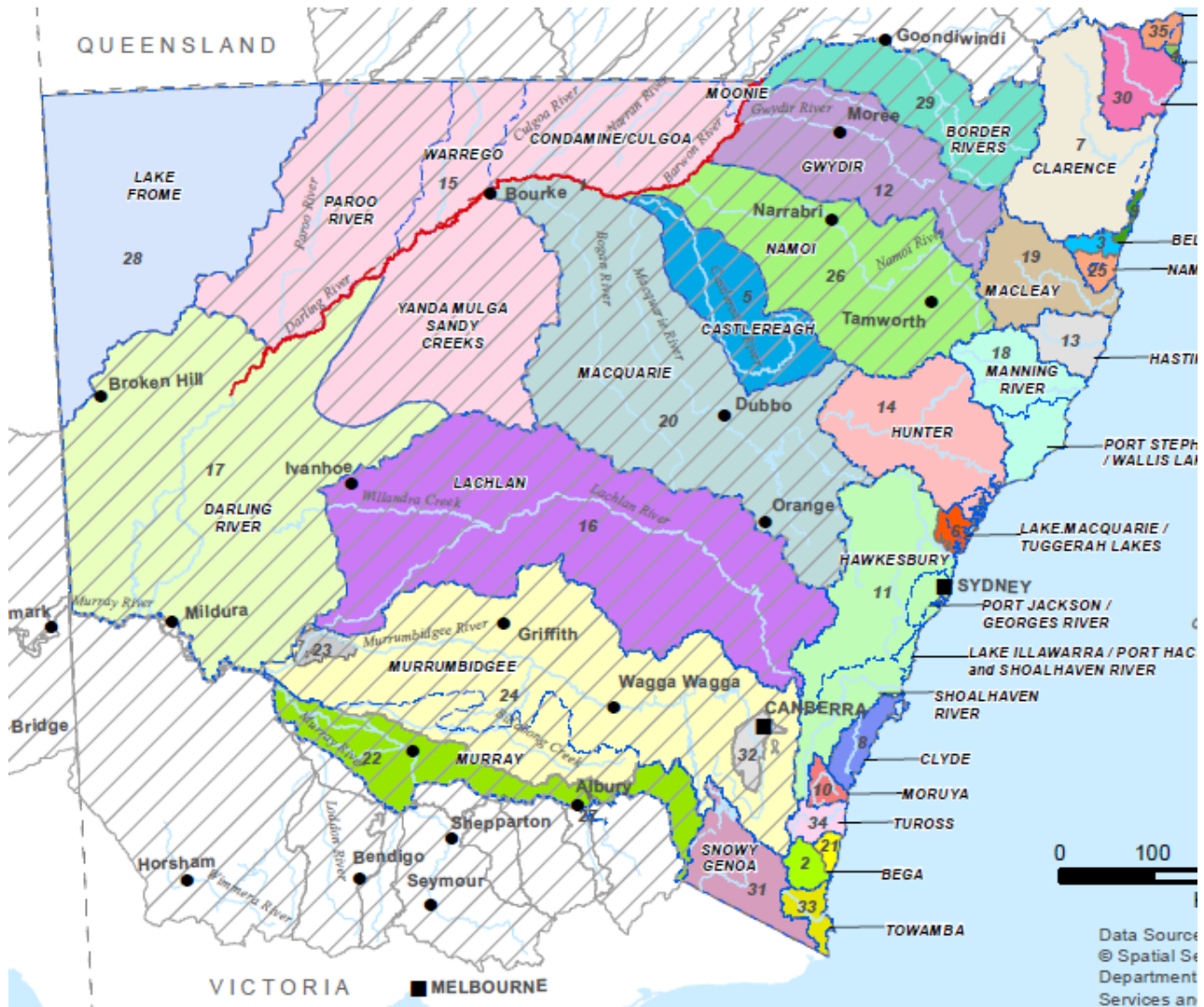
Sustainable Diversion Limit reporting areas

Figure 3 - MDB NSW Surface Water SDL areas - Source DPIE NSW



NSW Surface Water Sharing Plan areas

Figure 4 - Surface Water Sharing Plan areas - Source DPIE NSW

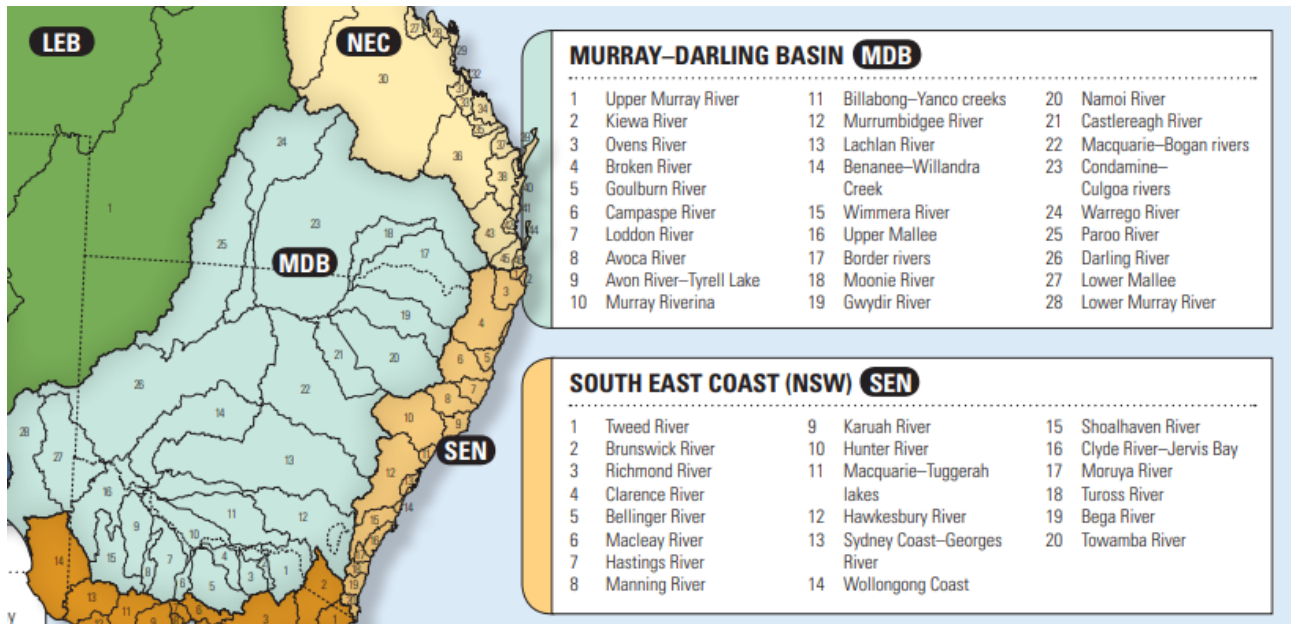


- 12 - Gwydir Unregulated River Water Sources 2012
- 13 - Hastings Unregulated and Alluvial Water Sources 2019
- 14 - Hunter Unregulated and Alluvial Water Sources 2009
- 15 - Intersecting Streams Unregulated River Water Sources 2011
- 16 - Lachlan Unregulated and Alluvial Water Sources 2012
- 17 - Lower Murray-Darling Unregulated River Water Source 2011
- 18 - Lower North Coast Unregulated and Alluvial Water Sources 2009
- 19 - Macleay Unregulated and Alluvial Water Sources 2016
- 20 - Macquarie Bogan Unregulated Rivers Water Sources 2012
- 21 - Murrumbidgee Unregulated and Alluvial Water Sources
- 22 - Murray Unregulated River Water Sources 2011
- 23 - Murrumbidgee Regulated River Water Source 2016
- 24 - Murrumbidgee Unregulated River Water Sources 2012
- 25 - Nambucca Unregulated and Alluvial Water Sources 2016
- 26 - Namoi Unregulated Rivers and Peel Unregulated River Water Sources 2012
- 27 - New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016

As there was sufficient difference in the defined boundaries and catchment names to potentially create misinterpretation of the various locations, this Review Report used the former Australian Water Resources Council (AWRC) listed MDB boundaries as the main reference for the various areas.

AWRC Basin areas

Figure 5 - AWRC Catchments in NSW - Source: Bureau of Meteorology Website



Earlier Hydrometric Network Rationalisation

The most recent, notable change to the New South Wales (NSW) Hydrometric network was through the Hydrometric Network Expansion project (HNE) 2008-11. This was through the BOM funded "Modernisation and Extension of Hydrologic Monitoring Systems Programme".

The HNE resulted in an increase in the provision of reliable water resources data in NSW necessary to:

- define the amount of water that is available to be shared between competing users.
- account for water for the environment.
- ensure that water extraction is undertaken in an orderly manner; and
- monitor compliance with licence and WSP conditions.

The New South Wales HNE project resulted in an increased network spatial coverage, improved site quality, and updated technology as follows:

- Established 74 water monitoring sites
- Established 14 groundwater bores
- Relocated 7 existing sites

- Upgraded 213 existing sites with Internet Protocol (IP) data loggers and telemetry systems for remote monitoring and data acquisition

The HNE project resulted in the establishment of 38 new hydrometric monitoring sites in the MDB. However, since the completion of the expansion project, some of the Water Sharing Plans have since been revised and updated.

Review Objective and Scope

The MDBA defines a hydrometric network as one which generates four types of data. This report has expanded the types to six to allow for the exclusion of groundwater and surface extractions which are outside the scope of this report.

- surface water – e.g., river flows and levels, storage volumes and levels,
- surface water – e.g., extraction rates and volumes, return flows and volumes (excluded in this review),
- meteorological – e.g., rainfall, evaporation, wind etc.
- water quality – e.g., salinity, salt load, nutrient loads, turbidity, algae count.
- groundwater – e.g., groundwater levels, quality,
- groundwater – e.g., extraction rates and volumes (excluded in this review)

This review will be used to ensure an adequate and prudent hydrometric network, and a proper and defensible list of monitoring sites. This report meets the requirement for reviewing surface water flow, water storage, surface water quality and meteorological monitoring networks. The groundwater and groundwater quality networks were reviewed and reported separately.

Consideration must be given to the ability of the current Gauging Station network to assess, manage and protect the state's water resources; this review has been completed to rationalise these needs. The sites are reported over 16 drainage basins with boundaries and names defined by the former Australian Water Resources Council and current as 12 October 2020.

The review and report are to recommend the retention of current monitoring sites needed, potential upgrades including new sites and/or parameters and potential downgrades including site closures.

Implementation of the recommendations will become the responsibility of the accountable parties within the NSW government agencies, subject to available funding. It is further recommended that the next review be completed within five years to keep continuity and build on the knowledge and outcomes from this exercise.

In scope

All WaterNSW owned and operated hydrometric monitoring sites in the MDB and stored in the Corporate Hydstra database, were included in the review process.

The review and report include:

- stream gauges
- water storages

- time series and discrete sampled water quality
- meteorological.

Out of scope

This review and report exclude the following:

- sites operated by other agencies or states such as Snowy Hydro, Icon Water, the Victorian and Queensland Governments in the MDB catchments,
- water take networks (which are generally covered by the NSW non-urban water metering framework), and
- groundwater level/volume and groundwater water quality (reviewed and reported separately).

Review Methodology

The WaterNSW Water Monitoring Program (June 2019) describes the water quantity and water quality monitoring undertaken to manage the catchments and water supply, to manage water quality risks and measure compliance with applicable standards and guidelines and was referenced along with the Corporate Hydstra database as part of this review.

A method was developed to address three elements:

- Part 1: Review the existing drivers for Surface Water Information.
- Part 2: Assess the current network for information reliability and its ability to meet current needs, and
- Part 3: The creation of an ideal network in terms of the locations and information types to assess the water resources of the New South Wales catchments with the Murray Darling Basin.

The review included the re-evaluation of the existing information drivers to ensure their currency:

1. Planning for future sharing
2. Operational Management
3. Compliance
4. Public Interest
5. Water Accounting – Institutional Government requirements
6. Special Purpose

Each station was individually scored by a project team led by SME and local staff drawn from the various functional groups and then benchmarked against a scoring matrix for low to high value.

The SMEs were nominated from the following agencies:

- Murray Darling Basin Authority (MDBA)
- NSW Natural Resources Access Regulator (NRAR)

- Bureau of Meteorology (BoM)
- NSW Department of Planning Industry and Environment (DPIE)
- WaterNSW

While sites were ranked for overall utility, the review recognised where the primary client already funds the site these were automatically confirmed for continued operation.

Each of the three tranches (Flow, Storage, Water Quality and Meteorological) used the same approach with SME deciding the relative importance against their information needs. This resulted in three lists of current, potential new and downgrades sites. Potential downgrade sites were collated across the tranches to ensure they were not in conflict with each other. SME were also asked to review the merit of sites proposed for upgrades by other SMEs.

Recommendations for the improvement of data quality reported from sites operated by water providers and the installation of advanced technology is included in this report. The quality classification of published discharge (flow) data requires improvement and a guide to operation and maintenance scheduling of gauging stations and is included.

Monitoring Site Review Priority Matrix

SME with their relevant knowledge of the sites were asked to rank existing sites in order of importance or priority from None to Critical (refer Table 1).

The priority Matrix was used to quantify the overall level of interest and relative importance of the sites and parameters across a range of stakeholders. The intent of this review was not only to confirm the current need for existing sites by the stakeholders, but also to identify and rank the importance of sites for use in later discussions around ongoing funding.

Table 1 - Priority rankings for Sites

Priority	Importance	Comment	Numeric rating
Priority 5	Critical	Must have	5
Priority 4	Very	Highly desirable	4
Priority 3	Moderate	Nice to have	3
Priority 2	Low	Limited Usage – Subject to change	2
Priority 1	Not currently	No Current need – Subject to change	1
Priority 0	None	No interest in Site	0

Stream Flow and Water Storages

Gauging Station Review Summary

Stream flow and storage monitoring sites are used for several purposes. They support both the Water Quality and Meteorological networks.

Within the Murray Darling Basin gauging stations are working reliably with the amounts of lost data continuing to fall, good data increasing, telemetry still being constant and the number of gaugings still being stable.

There are currently in the order of 500 Gauging Stations in operation. Typically, these sites collect level (at 460 sites) from which flow (at 430 sites) is derived, however electrical conductivity (at 170 sites), rainfall (at 83 sites) are also collected. Several sites record Level, Velocity, Flow, Electrical Conductivity, Water Temperature, Dissolved Oxygen, pH, and Rainfall.

While surface water level only sites are not being reported, they were not excluded in the initial survey of needs. Major reviews are normally at a frequency of every five years with minor changes being made between audits as the need arises.

To meet the information needs until the next formal review (for the next 5 years), the gauging station flow network should be rationalised with the:

- Retention of 453 of the 500 gauging stations in their current location and configuration.
- Propose the collection of flow at 25 potential gauging stations.
- Propose relocation of 3 gauging stations to more suitable sites.
- Suggested upgrade of 8 gauging stations with added equipment-parameters including telemetry.
- Potential downgrade of 47 gauging stations with removal of measured parameters or visit frequency, or closure.

Lists of potential upgrades and downgrade of stream flow and level sites are in Tables 7 and 8.

Surface Water Flow Accuracy Review

A key aspect of the review was to assess the accuracy of flow data from each of the gauging stations. The MDBA recommends that gauging stations be categorised as either A –High class and flow accurate to $\pm 5\%$; B-Medium Class between $\pm 5\%$ and $\pm 20\%$; C-Lower Class or greater than $\pm 20\%$.

A draft method, described later in this report, was adopted to assess the expected flow accuracy class from stream gauging stations using the control stability and gaugings. It does not cover control sensitivity, instrument calibration, level recorder adjustment, specific flow ranges or other contributing factors.

The review was carried out on 406 out of the possible 500 (MDB) stream flow gauging stations covering a three-year period (July 2016 to June 2019). Sites which did not have stage discharge rating tables (e.g., Acoustic Doppler Profiler in situ) and some sites which did not have enough flow gauging results (no flow or extremely low flow due to drought), were excluded.

Standard Deviations of gaugings from stage discharge ratings were calculated using the current or latest table and showed that 34% of the 406 sites fell into the Stable or High Class, 51% in the Moderately Stable or Medium Class and 15% in the Unstable or Lower Accuracy Class. The number of site visits and frequency of gaugings should be assessed against the site importance to the stakeholders, the range of flows needed and the control attributes.

Determining the accuracy of flow data at each has merit. After a significant amount of work initially by Queensland and New South Wales this matter was referred to the Water Monitoring Standards Technical Committee (WaMSTeC) for consideration. The outcome should result in a guideline endorsed by all the major water jurisdictions.

Uses of Streamflow Data

A review of the Uses (Information Drivers) of Streamflow data was undertaken and the drivers from the earlier review, are documented in the [Strategic Water Information and Monitoring Plan](#) (SWIMP). After consideration most of the information drivers are still current and are summarised below.

Summary of Information Drivers

Driver 1. Planning for future sharing of the resource

- Sustainability and sharing — for water users and the environment
- Drought and flood management
- Climate variability and climate change
- Medium and long-term forecasting.

Driver 2. Operational management

- River operations including efficiencies
- Flood operations

Driver 3. Compliance

- Auditing of compliance — MDB sustainable diversion limit and cap, water shepherding and water sharing plans
- Access rules (cease to pump, etc.) particularly for unregulated systems
- Drought sharing and flood plain harvesting
- Environmental monitoring.

Driver 4. Public interest

- Reporting/internet — key stakeholders, e.g., river heights and flows, water quality, current storage levels, reliable and near real-time
- Recreation — e.g., water levels, predicted conditions
- Communication – Understanding of water information content and context.

Driver 5. Water accounting, assessment and reporting.

- Public disclosure of water management information on water take — metering initiatives
- Statutory water reporting.

Driver 6. Special purpose water monitoring

- DPIE, WaterNSW and Manly Hydraulics Laboratory (MHL) are funded for water monitoring across NSW to support specific water management activities of other agencies, organisations, and industry. Data collected by various agencies is stored with stakeholders.

Stream Flow Gauging Station Network History

Network History

The first gauging stations in the NSW part of the MDB were installed in the mid to late 1800s. gauging stations were active in the Sydney Catchment several decades prior to those in the MDB. These gauging stations consisted of wooden boards marked in Feet and Inches (staff gauges) that were read daily by a citizen reader who either lived or worked close by. The network was limited to the major navigable streams. There are records of flood peaks dating back to the 1840s. There are 29 currently active gauging stations installed prior to 1900.

As the need for more information about stream flow characteristics increased the network was expanded. This coincided with the availability of chart water level recording devices that could be deployed and operated without the need for a gauge reader.

Table 2 - Count of current active sites and date range when installed

Number of currently active sites installed	Date Range
29	Before 1900
135	1900 and 1960
101	1960 and 1980
110	1980 and 2000
125	After 2000

After the creation of the Australian Water Resources Council (AWRC) in 1962 the Commonwealth government agreed to provide funds to State governments to expand the Gauging Station network.

This led to a significant increase in sites from the mid-1960s to the late 1970s used for the assessment of water resources and included the installation of chart recorders at many sites that were previously read by a gauge reader.

The network design as part of the Commonwealth involvement resulted in a logically designed network. This design relied on a small number of gauging stations being permanently installed with a larger number of sites moving after a period of several decades.

Gauging Stations were classified into three groups - Assessment, Operations and Project and were defined as follows:

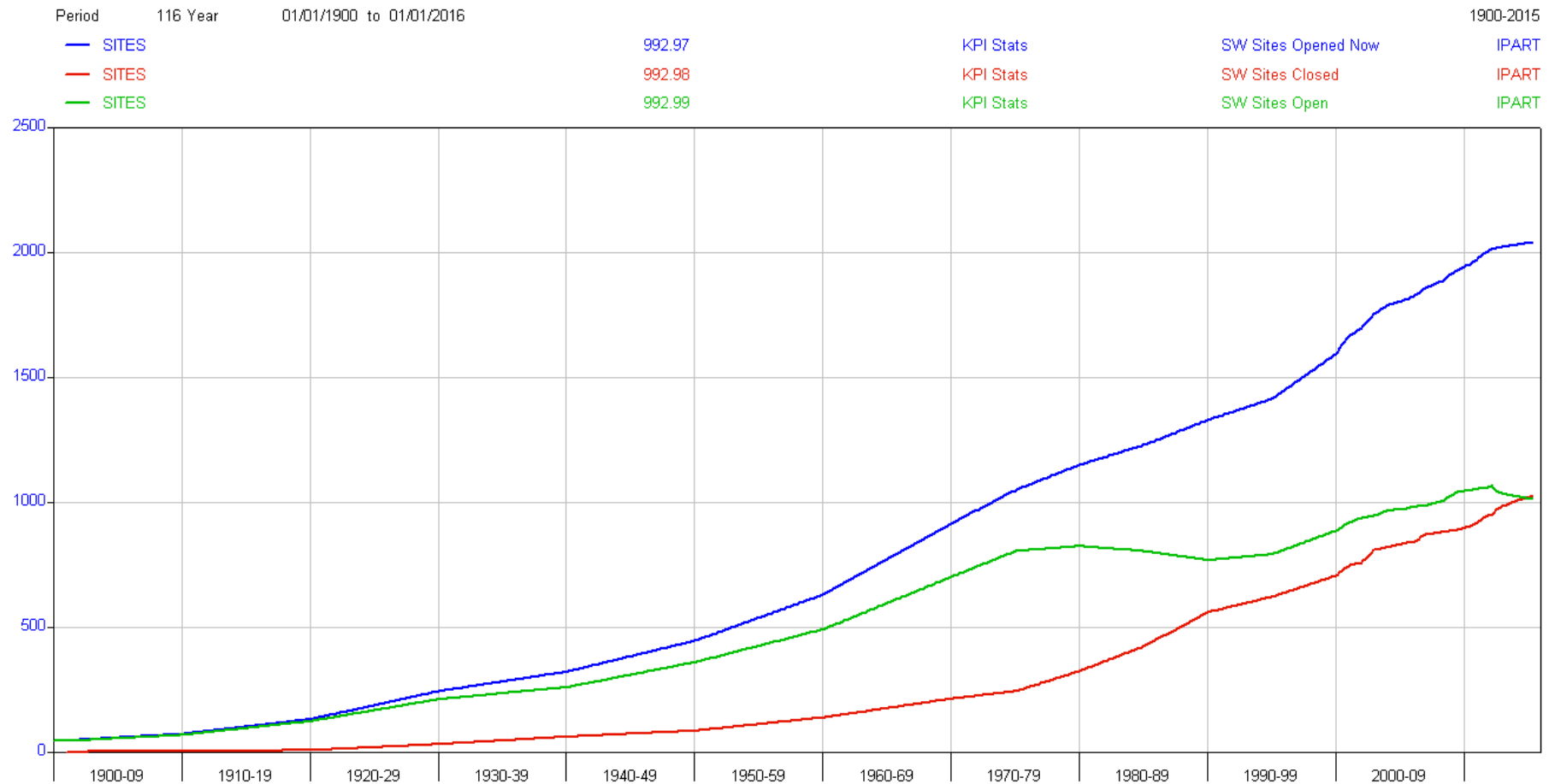
- The assessment stations primary (long term static) and secondary (shorter term – movable) to monitor spatial and temporal variations in runoff,

- Operations sites were on regulated streams used to aid river operations managers to deliver water for irrigation purposes,
- Project sites were operated to monitor flows for specific purposes other than assessment or operations.

Coinciding with the Commonwealth's involvement in the expansion of the gauging station network was the significant increase in the number and size (enlargements) of storages in NSW, particularly in the headwaters of streams in the Murray Darling. This resulted in a substantial number of stations that were used for assessment now being needed for river operations.

The Surface Water network has seen an incremental increase in monitoring sites since monitoring began. There have been 1900 sites opened with 800 closed leaving a network of 1100 sites. Sites range from a single staff gauge that is manually read infrequently to sites measuring and recording many parameters in near real-time.

Figure 6 - Graph of opened, closed and open gauging stations 1900-2019



Historic Network Design

During the second half of the last century the surface water monitoring network was primarily focussed on quantifying river flows and aid in delivering water for irrigation purposes. This network rationale is fully documented and contained in the report “Water Resources Commission — River Gauging Station Network Policy.” This document gave a good history of the development of the classification system and attempted to establish accuracy goals for assessment stations.

While much of the recent change in the river gauging network reflects client needs (as shown by the implementation of Water Sharing plans for unregulated, regulated surface water and groundwater) and project focus, the need for a water resource assessment network remains. An example of this is the ongoing need for long-term flow information for inclusion into water models.

Current Network Design

As the need for diverse types of information became clear the network moved away from one driven by resource assessment-operational to a more complete one.

There is an ongoing need to recognise sites are used for several purposes including flood warning, drought management, the environment, rainfall, salinity, water sharing plan operations, accounting, research, forecasting, compliance activities, and the public. Changes to existing and new information drivers will continue to help reshape the network composition.

Frequency of Stream Flow Gauging

The frequency of stream gauging can give confidence in the derived flow in between site visits. In the 2018-19 year a total of 462 gauging stations in the Basin were gauged a total 2634 times, at an average of 5.7 per site.

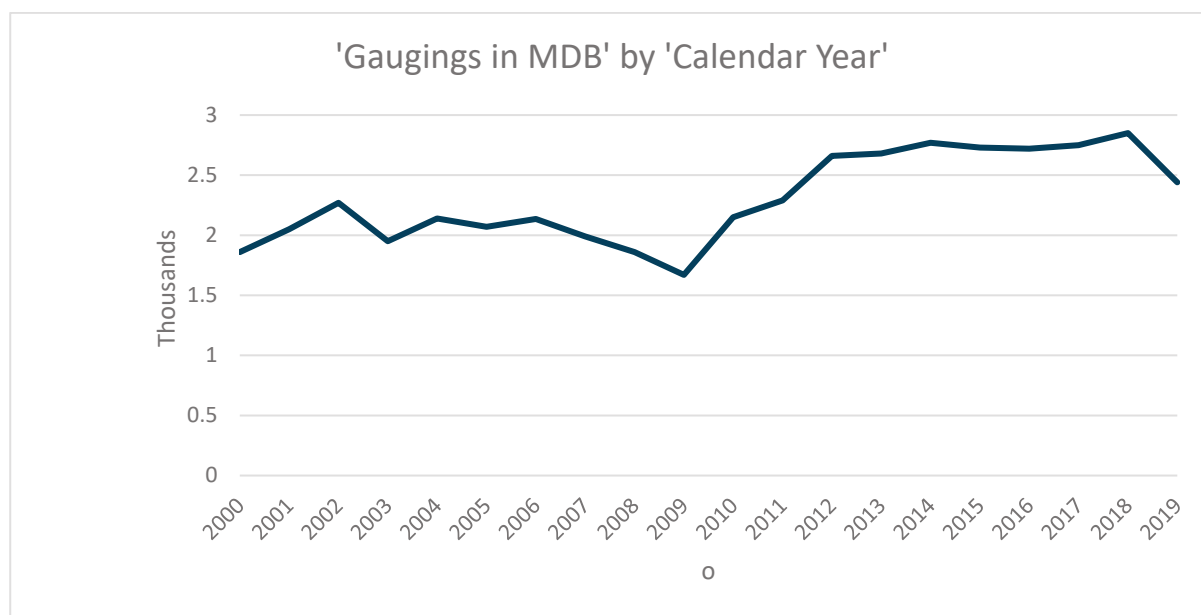
The most often gauged site in the MDB was at Murray River @ Doctors Point gauging station (Site ID 409017) with 16 in one year. However, several sites were found to have been gauged only once in that year. The number and frequency of gauging taken at a site is often as agreed between the primary client and the hydrometric service provider and can be due to the stability of the control and other factors including observed ‘no flow’ conditions due to the prolonged drought.

Figure 7 - Count of gauging in each river basin in 2018-19 - Source - WaterNSW Surface Water Database

2018-19 Year				
Total Sites with gaugings			462	
	Basin	Sites	Gaugings	Average
	401	13	76	5.8
	409	36	187	5.2
	410	98	566	5.8
	411	1	3	3.0
	412	57	346	6.1
	416	30	166	5.5
	417	1	5	5.0
	418	44	206	4.7
	419	64	434	6.8
	420	7	19	2.7
	421	59	341	5.8
	422	23	118	5.1
	423	5	33	6.6
	424	2	10	5.0
	425	22	124	5.6
	All	462	2634	5.7

The number of gaugings in the MDB have gradually risen over the earlier two decades with exceptions for the two periods of severe drought.

Figure 8 - Graph of annual count of Streamflow measurements in the MDB since 2000 – Source WaterNSW Surface Water Database



Gauging Station Control Stability and Data Accuracy

One of the enduring challenges in hydrography has been the problem of objectively assessing the performance of streamflow gauging stations.

It has long been recognised that the ability to assess station performance will help in managing the monitoring networks, firstly; by providing an indication of the accuracy of flow data (a flow accuracy 'index') being reported; secondly; by providing a means of quantifying the resources (inputs) needed to produce data of a specified quality (outputs); and thirdly; by providing a means to allocate additional (effort) resources to improve the quality index of data produced.

Anecdotally if the components that contribute to the development of flow data at a stream gauging station, if they are all collecting data at an optimum level, the control stability will be the main factor that determines flow accuracy, but it is also important to understand the impact of water level measurement uncertainty through the range of flows at the site but particularly in low flow regimes and at sites with insensitive controls.

The MDBA guidelines (Refer to Report ['Background to the development of guidelines for improved water information to aid Basin Plan compliance', Bewsher 2018](#)) suggested that gauging station be categorised as either Stable, Moderately Stable or Unstable and so a general method was developed using only a gauging station's physical control attribute to assess the flow expected data accuracy and to group sites accordingly into data classes of A, B and C. The matrix, which was used, also provides a means of assessing the frequency of site visits and gaugings required and to be scheduled to obtain the desired flow accuracy for the needed flow ranges.

Gauging Station Control

The quality of flow (and water level) data produced from the operation of a hydrometric gauging station is dependent on the stability of the gauging station 'control.' An assessment of flow gauging

deviations from the stage discharge rating tables at the time of the gauging can also provide some assurances in the stated flow accuracy recorded in between field site visits.

Sectional control is the cross-sectional geometry and make up downstream of the location where the water level is being measured at a gauging station.

Channel control is the geometry, channel roughness, stability, and other influences of the river channel downstream which may affect the level and/or flow at the gauging station.

These elements have a direct impact on the staged discharge relationship and therefore the level and flow accuracy. Other factors including site sensitivity, instrumentation calibration and site visit frequency can also affect the overall quality of flow data at a gauging station.

Examples of different Controls

- Stable control - natural permanent rock bar outcrop, a concrete causeway, fabricated weir with flow contained in the main channel in high flow
- Moderately Stable control - boulders, rock and gravel, cobbles and fabricated structures that are susceptible to variation due to debris build-up
- Unstable control – Natural controls consisting of sand, silt, or mud and subject to continual change from erosion, deposition, scouring and leakage

The following fit for purpose matrix illustrates that to produce high quality flow data more visits are needed at sites with less stable controls. In practical terms some sites may not produce flow data of high quality (or desired accuracy) irrespective of the number of visits due to the instability of the control and other factors. The approach which was taken by Queensland in responding to their MDB review was to assign a data quality requirement and relative importance to a site and from there determine the visit frequency.

Table 3 - Fitness for purpose matrix

Site and flow importance ranking to stakeholders	Control Stability assessment		
	Stable +/- 5% Std Deviation	Moderately stable > +/- 5% to +/- 20% Std Deviation	Unstable > +/- 20% Std Deviation
High ranked importance Numerical Ranking XXX	xx visits and gaugings	xxx visits and gaugings	Greater number of site visits and gaugings needed
Medium ranked importance Numerical Ranking XX	xx visits and gaugings	xxx visits and gaugings	xxx visits and gaugings
Low ranked importance Numerical Ranking X	Lesser number of site visits and gaugings needed	x visits and gaugings	xx visits and gaugings

Anecdotally there is consensus that if the components that contribute to the creation of flow data are all collecting data at an optimum level gauging station, control stability will be the factor that decides flow accuracy.

It was clear that there is not a single approach which has widespread acceptance and use in using control stability as a means for assessing and reporting on expected stream flow data accuracy this audit applied three approaches to assess control stability and to rate expected flow data accuracy classes from a gauging station and then compared the findings.

The methods used to review the Sectional Control stability were as follows:

Hydstra Station Database 'Control' metadata

The Corporate Hydstra Station database holds information about sites where time series data is collected. This database was filtered using the MDB site list to produce an output which included the Site Identifier (ID), Station Name and the free text field metadata describing the Site Control at each site. The metadata or description of the type and/or stability of sectional control was provided from field observations made by the hydrographer either at the time of commissioning or at some time during the operation of the gauging station.

The Site Control metadata and some local site knowledge helped to produce a preliminary control attribute such as S (Stable), MS (Moderately Stable) and U (Unstable) based on the fit for purpose matrix described earlier with sample results below.

Figure 9 - Example of control stability and description in corporate database (Hydstra)

Control Site List	Data Site List	Site Name	Control Stability	Control Description			
401007	401007	TUMBARUMBA CREEK AT TUMBARUMBA NO.2	MS	ControlNatural rock (bar and cobble).			
401008	401008	MANNUS CREEK AT TOOMA	S	ControlNatural Rock Bar			
401009	401009	MARAGLE CREEK AT MARAGLE	S	ControlROCK BAR			

Hydstra HYGREPT deviations from rating table

HYGREPT reports on the discharge and stage measurements (gaugings) of the listed sites for the specified period. A report was run covering a three (3) year period from July 2016 to end of June 2019 to capture a recent, representative number of gauging results (15-20) per site and use this to aid in a further improvement of the first assessment made of control attributes. Approximately 15-20 gaugings per site were included to also provide some statistical reliability.

HYGREPT report (opened with Notepad) shows the results as a summary of deviations of individual gauging from the rating table in effect at the time of the gauging, along with the gauge height and discharge and other related results. The deviation shows how measurements are spread out from the average (mean) or expected value of flow for that gauge height.

A pseudo-graph of the deviation of gauging from rating table condensed to +/-100% provides a quick overall operational perspective of the control stability and this information was then used to update the assessment of control attributes derived from metadata in the Hydstra Station database. Note that all available flow gaugings were used and those sites without rating tables and/or gaugings were excluded from the overall assessment. (HYGREPT output below for one hydrometric stream flow site).

Figure 10 - Example of gauging deviation for 401007 Tumbarumba at Tumbarumba

Site 401007 TUMBARUMBA CREEK AT TUMBARUMBA NO.2
 VarFrom 100.00 Stream Water Level
 VarTo 141.00 Discharge Rate
 Period 01/07/2016 - 30/06/2019

Date	Number	Stage	Flow	Deviation	Area	Velocity	Meth	-100%	Deviation	100%
14:00_03/08/2016	385.0	0.940	385.776000	-0.64	8.3570	43.310	BW	*	*	*
14:12_02/11/2016	386.0	0.829	300.240000	-2.95	4.3390	69.290	BW	*	*	*
09:56_10/11/2016	387.0	0.740	260.750000	4.38	4.0320	64.620	BW	*	*	*
13:47_14/12/2016	388.0	0.578	134.520000	4.30	2.9650	45.440	BW	*	*	*
13:02_08/03/2017	389.0	0.350	36.300000	-5.99	1.4800	24.510	WA	*	*	*
11:30_06/04/2017	390.0	0.335	34.370000	1.39	1.6300	21.130	WA	*	*	*
15:06_18/07/2017	391.0	0.431	62.430000	-4.54	2.4000	25.980	WA	*	*	*
10:32_05/09/2017	392.0	0.515	97.780000	1.02	2.6100	37.440	WA	*	*	*
12:57_28/11/2017	393.0	0.395	56.120000	5.19	1.8700	29.950	WA	*	*	*
14:21_14/02/2018	394.0	0.281	20.250000	-0.89	1.4200	14.250	WA	*	*	*
14:36_17/04/2018	395.0	0.325	31.400000	0.79	2.9860	10.500	WA	*	*	*
11:11_17/05/2018	396.0	0.303	26.900000	4.63	2.6920	10.000	BO	*	*	*
11:11_02/08/2018	397.0	0.359	41.470000	-0.34	3.6900	11.320	BW	*	*	*
11:29_10/08/2018	398.0	0.549	85.100000	-24.88	4.8820	17.450	BW	*	*	*
13:37_18/10/2018	399.0	0.404	54.400000	1.80	3.7710	14.400	AD	*	*	*
10:35_23/01/2019	400.0	0.253	11.580000	-5.12	2.2900	5.070	AD	*	*	*
09:13_20/03/2019	401.0	0.215	8.010000	3.81	1.0800	7.410	AD	*	*	*
14:19_22/05/2019	402.0	0.285	22.280000	25.94	1.4100	15.780	WA	*	*	*

* after gauge number indicates Weighted Mean Gauge Height method
 ▲WaterNSW

WaterNSW operational hydrographer assessment

The routine Hydrographer running a gauging station has the best overall knowledge of the performance of a site including the type and condition of the gauging station control and other attributes of a site which could affect the level and flow quality.

WaterNSW supplied an audit summary of the gauging stations operated in the MDB, naming those which are conventionally rated (stage discharge relationship developed from flow gaugings). Sites with Acoustic Doppler Velocity (ADV) sensors, regulated structures, major dams, flood warning or level only sites were excluded from the assessment.

The operational hydrographer reported on the control at their sites using the following definitions along with existing site knowledge rate each as Stable, Moderately Stable and Unstable:

Figure 11 - Description of Control Definitions

Control Definitions		
Typical Rock Bar = Stable Control		
Man Made Weir = Stable Control		
Typical Gravel/Rock Control = Moderately Stable		
Typical Sand/Mud = Unstable Control		

Statistical assessment using Hydstra HYDBSQL

HYDBSQL is a Hydstra program that can run SQL retrievals across Hydstra databases. HYDBSQL was used to extract gaugings from the gauging database and to produce a statistical summary of flow gauging Standard Deviations from current stage-discharge rating table as well as the Standard Deviation from the table at the time the gauging was taken. Gaugings with dubious quality Codes of 51, 52, 71, 52, 53 and sites without rating tables were excluded.

The Standard Deviation (%) from a stage discharge rating table at the time of gauging gives a better operational perspective and Standard Deviation (%) from current stage discharge rating gives a better longer-term perspective.

The Standard Deviation from current stage-discharge rating was used to apply a control stability and flow quality rating for the range of flows assessed in the selected period of record only.

Where sites with a large Standard Deviation from rating at the time of gauging and a smaller Standard Deviation from current rating table this provides an indication of a greater effort and cost in the site maintenance, gauging frequency, desktop review and updates to the stage discharge rating table.

Those sites with stable control attributes and/or which have a small Standard Deviation from rating at the time of the gauging and similarly small Standard Deviation from the current rating table require less operational effort.

Figure 12 - Sample of gauging station standard deviations

Site	STD DEV from rating at time of gauging	STD DEV from current rating	Gaugings in last 3 Years	Average Per Year
401007	12.25	9.49	19	6.3
401008	20.06	6.99	15	5.0
401009	34.49	22.68	15	5.0
401012	6.53	3.58	20	6.7
401013	23.01	5.62	16	5.3
401014	12.33	6.23	17	5.7

Overall assessment of Control Stability and expected Flow Accuracy

Each of the above assessment results were used to compile a combined final MDB Sites list of 406 sites each one with a control attribute result which could be compared with results from each of the methods at each of 406 sites. (Some sites were eliminated in each of the above assessment processes for a variety of reasons and therefore a final list of 406 sites).

Table 4 - Summary of Control Stability assessment of 406 sites July 2016 to June 2019:

Control Stability	HYGREPT and SITE database metadata	STD Deviation of Rating at time of gauging	STD Deviation of gauging from Current Rating	WaterNSW Hydrographer assessments
A-Class Stable Control Expected flow data +/- 5%	146	31	138	119
B-Class Moderately Stable Control Expected flow data > +/-5% to +/-20%	84	182	208	119
C-Class Unstable Control Expected flow data > +/-20%	176	193	60	168

Control Stability	HYGREPT and SITE database metadata	STD Deviation of Rating at time of gauging	STD Deviation of gauging from Current Rating	WaterNSW Hydrographer assessments
Total	406	406	406	406

To determine the accuracy of flow data at any gauging station is not a simple task as was highlighted during this review. Most agree that control stability plays the most significant part in being able to assess the expected or predicted flow accuracy.

Gauging station flow ranges

Most gauging stations in the network attempt to measure the entire range of flows, from cease to flow up to and including flood flows. This is partially based on the need to collect as complete a dataset as possible for current and future use.

During interactions with several the users of flow information it became clear that data users had needs at different flow rates. In this network review the SMEs were directed to give an overall ranking of flow and asked to say which range of flows were of more interest. As this was the first time this had been attempted in NSW at such a large scale, the range was divided into three categories of Low, Medium, and High flows.

A potential benefit of showing the range of flows that are most important is to enable more emphasis to be placed on gauging that range of levels and flows to improve on the derived level to flow accuracy of the rating table. While some sites had a clear low medium or high flow priority, the Basin wide outcome was that there was minor difference in relative importance of flow range across the network.

Stream Flow Site Performance Review

A data review was undertaken to provide the SMEs with information at a catchment level summarising the reliability of primary data collected at gauging stations including water level data capture, the number of stream flow gaugings and prompt data availability.

The Hydrometric database custodian, WaterNSW, has a comprehensive list of audits undertaken for each site on a scheduled basis. This allows key stakeholders access to data in many instances updated daily, reducing the need for more structured reports.

A typical site may have more than twenty data audit tests. The list below is a typical example.

Figure 13 - Performance Indicators for gauging stations – Example is for Murray River at Doctors Point Source - WaterNSW Surface Water Database

Variable	
991.30	Key Performance Indicator - Counter - Visit Count
991.40	Key Performance Indicator - Counter - Gauging Count (>0)
991.41	Key Performance Indicator - Counter - Gauging Count (All)
991.50	Key Performance Indicator - Counter - All sections - count
991.51	Key Performance Indicator - Counter - Cross Sections - Count
991.60	Key Performance Indicator - Counter - #History DB entries
992.00	Key Performance Indicator - Stats - Level days to last Arc.
992.05	Key Performance Indicator - Stats - % Good Data - Level
992.06	Key Performance Indicator - Stats - % Lost Data - Level
992.07	Key Performance Indicator - Stats - Historic Level backlog
992.11	Key Performance Indicator - Stats - EC- Days to last Arc.
992.15	Key Performance Indicator - Stats - % Good Data - EC
992.16	Key Performance Indicator - Stats - % Lost Data - EC
992.22	Key Performance Indicator - Stats - # Inst. with OD Calib.
992.32	Key Performance Indicator - Stats - P Level AM
992.33	Key Performance Indicator - Stats - P Level PM
992.41	Key Performance Indicator - Stats - Gauging Students T Test
992.45	Key Performance Indicator - Stats - Gauging Deviation 5%
992.46	Key Performance Indicator - Stats - Gauging Deviation 10%
992.47	Key Performance Indicator - Stats - Gauging Deviation 20%
992.55	Key Performance Indicator - Stats - % Good Data - Flow
992.56	Key Performance Indicator - Stats - % Lost Data - Flow
992.80	Key Performance Indicator - Stats - Temp-Days to last Arc.
992.85	Key Performance Indicator - Stats - % Good Data - Temp
992.86	Key Performance Indicator - Stats - % Lost Data - Temp

For this gauging station review the focus areas were the following:

Percentage of lost data

The amount of lost data remains one of the Key Performance Indicators (KPI) when assessing the robustness of a network of gauging stations. In some cases, short periods of lost water level data can be estimated with confidence. In other cases, estimation of lost data with a degree of confidence is not possible such as in the case of Electrical Conductivity data and some other water quality parameters.

Percentage of good data

The amount of good data remains one of the KPIs when assessing the robustness of a network of gauging stations. Good data is that which meets the accuracy needs of the key stakeholders. Data is sometimes downgraded from good to categories which are sometimes referred to as Fair or Poor. These data can be used if fit for purpose.

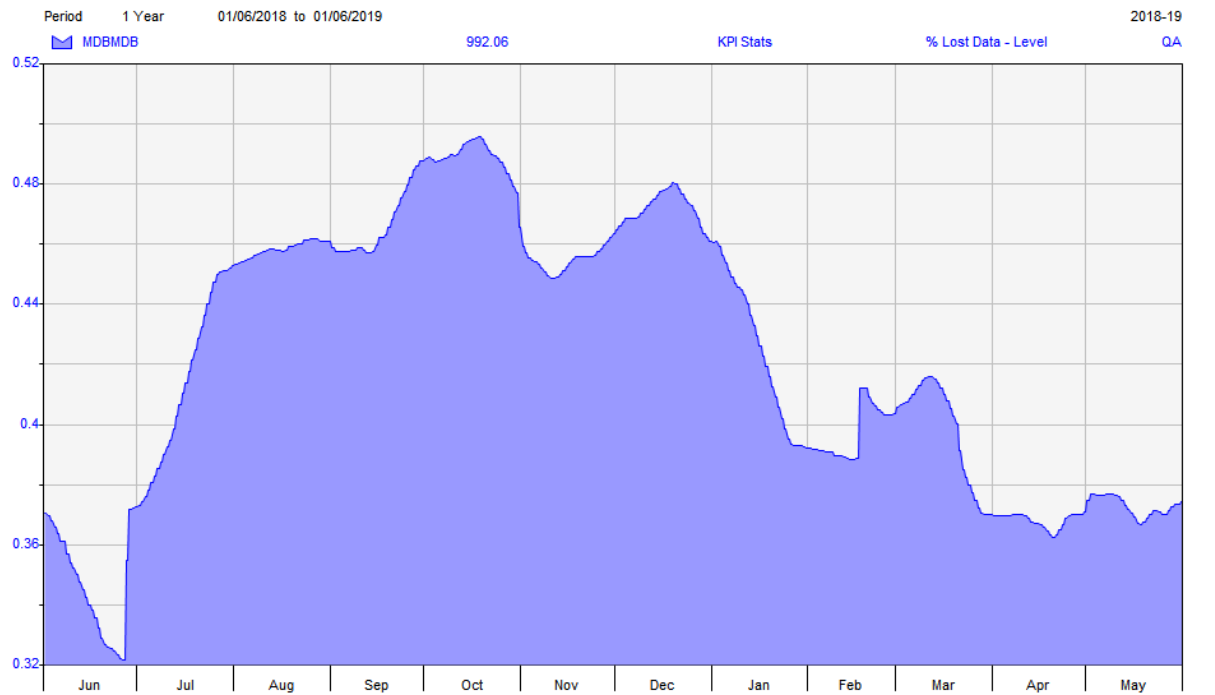
Availability and Reliability of Telemetry Data

From an operational perspective the reliability with which data is remotely captured and processed is an important KPI. Installation of telemetry is considered routine for new installations if the site is within the mobile telephone cellular coverage footprint. All telemetered sites are updated on a regular basis with water level and flow data generally updated and available hourly.

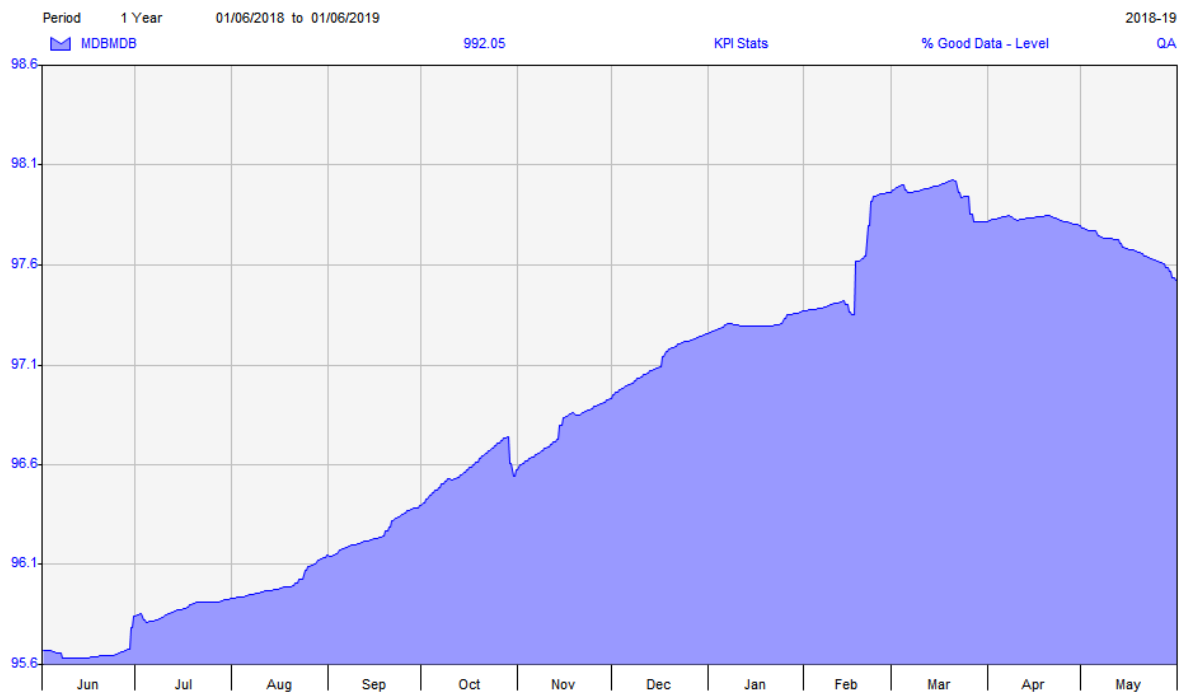
Approximately 40 sites or 8% of the network are manually read gauges without instrumentation and are not available in near to real time.

Lost and Good level data at MDB sites

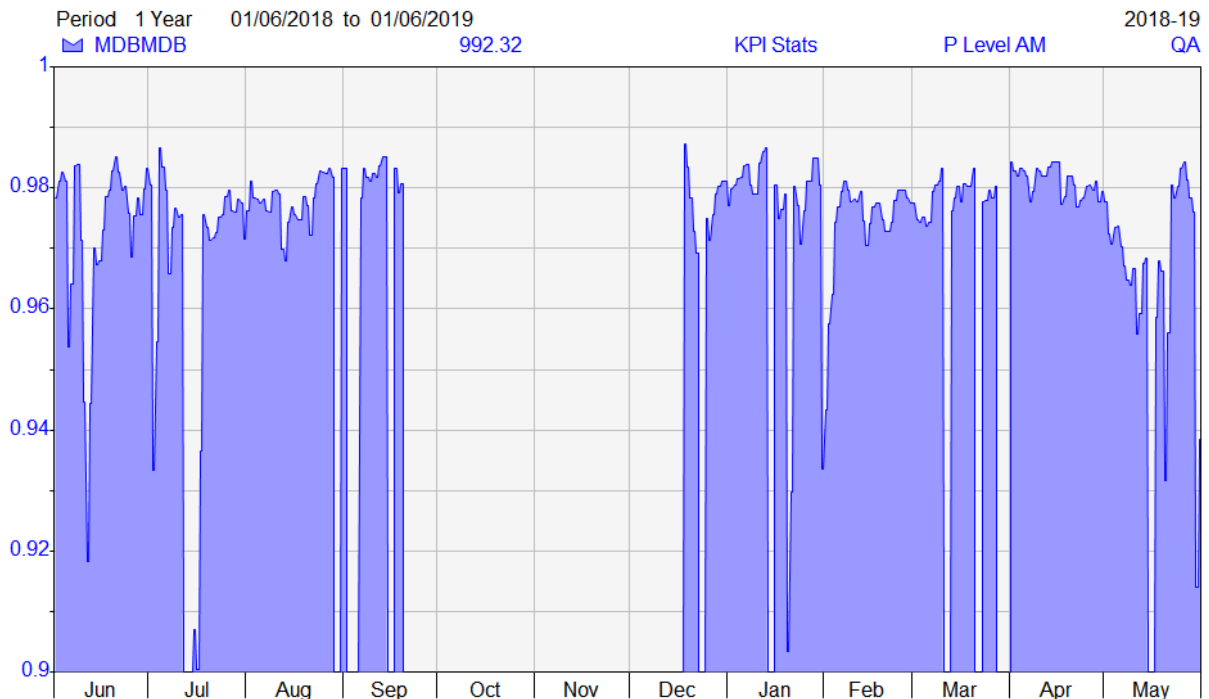
Figure 14 - Graph of percentage of lost data MDB sites - Source WaterNSW Surface Water Database



The average percentage of lost water level data from all 499 Sites over a one-year period from 1st June 2018 to 1st June 2019 was approximately 0.4 % (Figure 14) and with a trend of less data being lost. In the same period the data capture rate of good data was at 97% (Figure 15).

Figure 15 - Graph of percentage of good data MDB sites - Source WaterNSW Surface Water Database

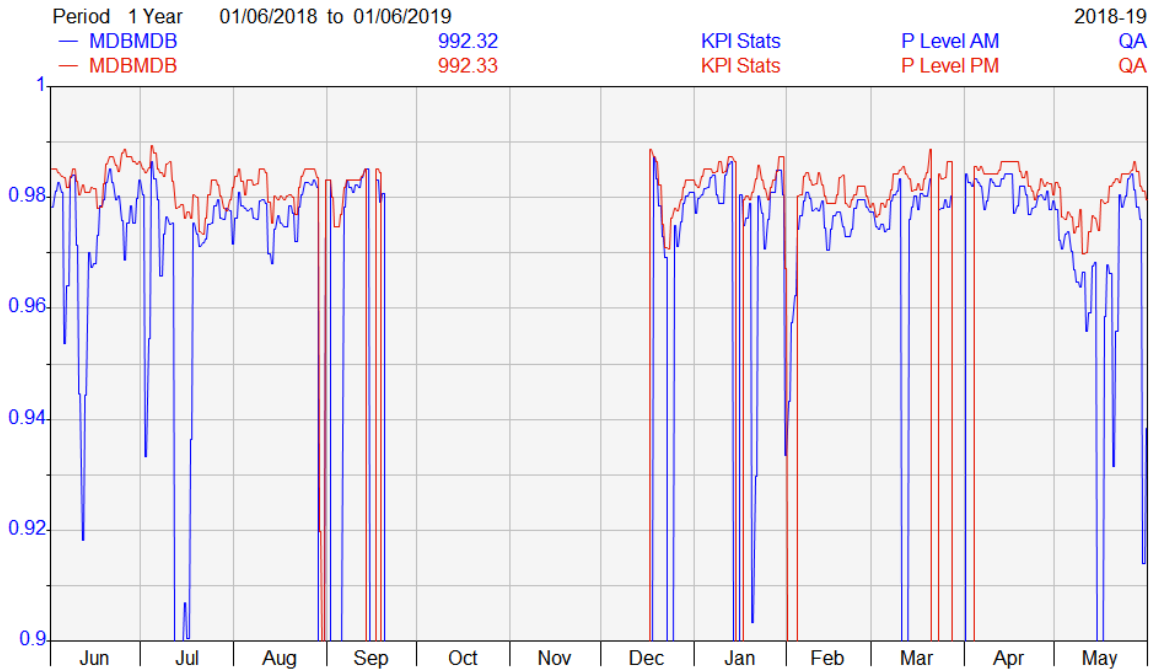
Telemetry data capture rates including all online parameters (WQ and Meteorological)

Figure 16 - Graph of percentage of telemetry data capture rates at MDB sites - Source WaterNSW Surface Water Database

The average telemetry data capture rates are consistently at 97% during the review period 1st June 2018 to 1st June 2019.

Gap periods (white space in Figure 16 and Figure 17) are indicative of telemetry data capture statistics not being collected. Anecdotal evidence is that telemetry capture rates were consistent during the audit period.

Figure 17 - Graph of percentage of telemetry data capture rates AM and PM at MDB sites - Source WaterNSW Surface Water Database



Comparison of morning (AM) and afternoon (PM) capture rates (Figure 17) show a higher PM rate is indicative of sites being proactively being monitored and rectified.

Water Storage Review Summary

35 major water storages in the MDB excluding those operated by Snowy Hydro and those in the Australian Capital Territory were subject to a similar review to that of the surface water level and flow gauging stations. This report includes a review of the monitoring of water storages and includes primarily water level data and derived volume from rating tables. The review recommends retaining all 35 storage level monitoring sites in their current location, and the potential upgrade of 5 sites with additional parameters including telemetry with no site downgrades or terminations.

This review recognised sites operated for DPIE or the MDBA by WaterNSW. Sites operated by other agencies were also identified as being important to NSW agencies. Access to data from these sites is important particularly where water flows across borders and are expected to be reported in other State agency responses to the MDB Compliance Compact and are excluded in this report.

Water Storage Current Sites List

Table 5 - Storages in MDB - Source WaterNSW Surface Water Database

Site	Storage Name
401027	MURRAY RIVER AT HUME DAM - STORAGE GAUGE NO.2
410102	TUMUT RIVER AT BLOWERING DAM - STORAGE GAUGE
41010287	NIMMING POLLEN CREEK AT STORAGE GAUGE
41010904	MURRUMBIDGEE RIVER AT BEREMBED WEIR - STORAGE GAUGE
41010922	MURRUMBIDGEE RIVER AT GOGELDRIE WEIR - STORAGE GAUGE
41010928	MURRUMBIDGEE RIVER AT HAY WEIR - STORAGE GAUGE
41010941	MURRUMBIDGEE RIVER AT MAUDE WEIR - STORAGE GAUGE
41010966	MURRUMBIDGEE RIVER AT REDBANK WEIR - STORAGE GAUGE
41010971	TOMBULLEN CREEK AT TOMBULLEN WEIR - STORAGE GAUGE
41010981	MURRUMBIDGEE RIVER AT YANCO WEIR - STORAGE GAUGE
410131	MURRUMBIDGEE RIVER AT BURRINJUCK DAM - STORAGE GAUGE
410190	MAIN CANAL AT BUNDIDGERRY REGULATOR - STORAGE GAUGE
412010	WYANGALA DAM AT STORAGE GAUGE
412048	LACHLAN RIVER AT LAKE BREWSTER WEIR
412106	BELUBULA RIVER AT CARCOAR DAM-STORAGE GAUGE
412107	LAKE CARGELLIGO AT STORAGE GAUGE
412108	LAKE BREWSTER AT STORAGE GAUGE
412172	LACHLAN RIVER AT JEMALONG WEIR - STORAGE GAUGE
416030	SEVERN RIVER AT PINDARI DAM-STORAGE GAUGE
418035	GWYDIR RIVER AT COPETON DAM-STORAGE GAUGE
418043	GWYDIR RIVER AT TAREELAROI WEIR-STORAGE GAUGE
418051	GWYDIR RIVER AT BOOLOOROO WEIR-STORAGE GAUGE
419041	NAMOI RIVER AT KEEPIT DAM - STORAGE GAUGE
419060	NAMOI RIVER AT GUNIDGERA WEIR - STORAGE GAUGE
419062	NAMOI RIVER AT MOLLEE WEIR - STORAGE GAUGE
419069	PEEL RIVER AT CHAFFEY DAM - STORAGE GAUGE
419080	MANILLA RIVER AT SPLIT ROCK DAM STORAGE GAUGE
421078	MACQUARIE RIVER AT BURRENDONG DAM - STORAGE GAUGE
421148	CUDGEGONG RIVER AT WINDAMERE DAM-STORAGE GAUGE
421189	FISH RIVER AT OBERON DAM - STORAGE GAUGE
425020	DARLING RIVER AT LAKES WETHERELL+ TANDURE TOTAL STORAGE
425021	DARLING RIVER@LAKE PAMAMAROO+COPI HOLLOW TOTAL STORAGE
425022	DARLING RIVER AT LAKE MENINDEE - STORAGE GAUGE
425023	LAKE CAWNDILLA - STORAGE GAUGE
42510037	MENINDEE LAKES AT COPI HOLLOW

Water Storage Site Performance Review

Figure 18 - Data Inventory - Water Storages – Source WaterNSW Surface Water Database

Archive Data Inventory for														
\$=Telemetered														
*=Storage														
Station ID	FLOWS		HEIGHTS		RATINGS		No. No.		R A W C T		W H O		Discont.	NAME
	Start	End	Start	End	First Starts	Last Starts	Last of Tab	of of Tabs	n p p	a t t o u i x	n r p n m y	Date		
\$401027	*		01/08/1969	03/07/2020					R				DWR SFH	HUME DAM STORAGE
\$410102	*		21/10/1975	21/02/2011									DWR SFH	BLOWERING DAM
41010287	*		17/10/2011	05/05/2020				3					DWR SFH	NIMMIE STORAGE
\$41010904	*		13/03/2004	18/06/2020					R T C				DWR SFH	BEREMBED STORAGE
\$41010922	*		06/06/2006	20/05/2020									DWR SFH	GOGELDRIE STORAGE
\$41010928	*		18/06/2006	05/05/2020									DWR SFH	HAY STORAGE
\$41010941	*		23/11/2006	05/05/2020									DWR SFH	MAUDE STORAGE
\$41010966	*		28/08/2006	17/02/2020									DWR SFH	REDBANK STORAGE
\$41010971	*		17/06/2009	27/03/2020									DWR SFH	TOMBULLEN STORAGE
\$41010981	*		01/07/2003	16/04/2020									DWR SFH	YANCO STORAGE
\$410131	*		01/07/1974	16/07/2020					R T				DWR SFH	BURRINJUCK DAM
410190								15					DWR XFR	BUNDIDGERRY STORAGE
412010	*	01/01/1979	01/01/1981	22/11/1960	31/07/2019				R T		H		DWR CH	WYANGALA STORAGE
412048	*	01/01/1801	01/01/1970	01/01/1990	24/06/2020	01/05/1955	23/10/2019	111 14 192					DWR CR	LACHLAN LAKE B WEIR
412106	*	01/01/1979	09/05/2008	23/11/1970	20/06/2019				R T		W H		DWR CH	CARCOAR DAM
412107	*	01/01/1975	01/01/1981	01/01/1990	24/07/2019				R T		W H		DWR CH	CARGELLIGO STORAGE
412108	*		01/01/1990	14/02/2017	01/01/2012	01/01/2012	100 1	4 R T					DWR CH	BREWSTER STORAGE
\$412172	*		20/03/1990	18/12/2019									DWR XFR	JEMALONG STORAGE
\$416030	*		01/01/1969	21/07/2020	01/01/1900	01/01/1900	100 1	R T					DWR SFH	PINDARI DAM
416065													DWR DISC	BOGGABILLA W.STORAGE
416315A	*		01/05/1978	08/07/1984					R				QLD	GLENLYON DAM
\$418035	*		01/07/1974	16/06/2020					R T		W H		DWR SFH	CORETON DAM
418043	*		01/10/1980	08/04/2020	01/01/1900	01/01/1900	1 1						DWR SFH	TAREELAROI STORAGE
\$418051	*		01/06/1989	09/04/2020	01/01/1900	01/01/1900	100 1						DWR SFH	BOOLOOOROO W. STORAGE
\$419041	*		01/07/1974	21/05/2020					R				DWR SFH	KEEPT DAM
\$419060	*		14/12/2006	04/08/2020									DWR CH	NAMOI@GUNDIGERA STOR
\$419062	*		14/12/2006	14/07/2020									DWR CH	NAMOI@MOLLEE WR STOR
419066	*		10/01/1974	11/12/2012				4		C			DWR PRH	GORAN LK@HOCKEY POKEY
\$419069	*		01/06/1979	17/06/2020					R T				DWR SFH	CHAFFEY DAM
\$419080	*		22/12/1989	19/05/2020	31/01/2000	31/01/2000	1 1	R T		W H			DWR SFH	SPLIT ROCK DAM
421078	*	01/01/1801	01/01/1982	30/03/1965	25/03/2020	01/10/1976	01/10/1976	100 1					DWR CH	BURRENDONG DAM
421148	*		01/07/1985	03/06/2020				1 R					DWR CH	WINDAMERE DAM
\$421189	*		30/11/2009	25/03/2020									DWR XFR	OBERON DAM
\$425020	*		01/05/1979	25/06/2020	01/01/1987	01/01/1987	100 1						DWR SFH	L WETHERELL+TANDURE
\$425021	*		01/05/1979	25/06/2020	01/01/1987	01/01/1987	100 1						DWR SFH	L PAMARAROO + COPI H
\$425022	*		01/07/1968	25/06/2020	01/01/1987	01/01/1987	100 1						DWR SFH	LAKE MENINDEE
425023	*		01/05/1979	23/06/2020	01/01/1987	01/01/1987	100 1						DWR SFH	LAKE CAWNDILLA
42510037													DWR SFPR	MENINDEE@COPI HOLLOW
4261093													VRW XFR	Lake Victoria

Table 6- Percentage of reliable storage water level data MDB Sites - Source WaterNSW Surface Water Database

Site	Storage Name	Reliable Data	Unreliable Data
401027	MURRAY RIVER AT HUME DAM - STORAGE GAUGE NO.2	100%	0%
410102	TUMUT RIVER AT BLOWERING DAM - STORAGE GAUGE	100%	0%
41010287	NIMMING POLLEN CREEK AT STORAGE GAUGE	99%	1%
41010904	MURRUMBIDGEE RIVER AT BEREMBED WEIR - STORAGE GAUGE	100%	0%
41010922	MURRUMBIDGEE RIVER AT GOGELDRIE WEIR - STORAGE GAUGE	100%	0%
41010928	MURRUMBIDGEE RIVER AT HAY WEIR - STORAGE GAUGE	100%	0%
41010941	MURRUMBIDGEE RIVER AT MAUDE WEIR - STORAGE GAUGE	100%	0%
41010966	MURRUMBIDGEE RIVER AT REDBANK WEIR - STORAGE GAUGE	100%	0%
41010971	TOMBULLEN CREEK AT TOMBULLEN WEIR - STORAGE GAUGE	100%	0%
41010981	MURRUMBIDGEE RIVER AT YANCO WEIR - STORAGE GAUGE	100%	0%

Site	Storage Name	Reliable Data	Unreliable Data
410131	MURRUMBIDGEE RIVER AT BURRINJUCK DAM - STORAGE GAUGE	100%	0%
410190	MAIN CANAL AT BUNDIDGERRY REGULATOR - STORAGE GAUGE	100%	0%
412010	WYANGALA DAM AT STORAGE GAUGE	100%	0%
412048	LACHLAN RIVER AT LAKE BREWSTER WEIR	100%	0%
412106	BELUBULA RIVER AT CARCOAR DAM-STORAGE GAUGE	100%	0%
412107	LAKE CARGELLIGO AT STORAGE GAUGE	100%	0%
412108	LAKE BREWSTER AT STORAGE GAUGE	100%	0%
412172	LACHLAN RIVER AT JEMALONG WEIR - STORAGE GAUGE	100%	0%
416030	SEVERN RIVER AT PINDARI DAM-STORAGE GAUGE	100%	0%
418035	GWYDIR RIVER AT COPETON DAM-STORAGE GAUGE	100%	0%
418043	GWYDIR RIVER AT TAREELAROI WEIR-STORAGE GAUGE	100%	0%
418051	GWYDIR RIVER AT BOOLOOROO WEIR-STORAGE GAUGE	100%	0%
419041	NAMOI RIVER AT KEEPIT DAM - STORAGE GAUGE	100%	0%
419060	NAMOI RIVER AT GUNIDGERA WEIR - STORAGE GAUGE	100%	0%
419062	NAMOI RIVER AT MOLLEE WEIR - STORAGE GAUGE	100%	0%
419069	PEEL RIVER AT CHAFFEY DAM - STORAGE GAUGE	100%	0%
419080	MANILLA RIVER AT SPLIT ROCK DAM STORAGE GAUGE	100%	0%
421078	MACQUARIE RIVER AT BURRENDONG DAM - STORAGE GAUGE	100%	0%
421148	CUDGEGONG RIVER AT WINDAMERE DAM-STORAGE GAUGE	100%	0%
421189	FISH RIVER AT OBERON DAM - STORAGE GAUGE	100%	0%
425020	DARLING RIVER AT LAKES WETHERELL+ TANDURE TOTAL STORAGE	100%	0%
425021	DARLING RIVER@LAKE PAMAMAROO+COPI HOLLOW TOTAL STORAGE	100%	0%
425022	DARLING RIVER AT LAKE MENINDEE - STORAGE GAUGE	100%	0%
425023	LAKE CAWNDILLA - STORAGE GAUGE	100%	0%
42510037	MENINDEE LAKES AT COPI HOLLOW	100%	0%

Reliability of storage telemetry

The majority of storage level data and information is collected by two automated systems: SCADA radio telemetry and Hydrotel cellular network telemetry. Data is retrieved and then made available on the WaterNSW internet shortly after it is processed.

Use of Water Storage Data

Storage level and volume data is primarily collected using the WaterNSW SCADA network and then made available to other stakeholders. These sites are critical to the management of water in the Basin.

Public Interest - Water Storage and Stream Flow

It is difficult to report with confidence on the level of public use of data made available on the web, or indeed the importance of that data to the user. The options for the public to access data are expanding rapidly. One tool (weblog) used in earlier audits was used to rank sites against each other. It has been used again to give a sign of the relative volume of users for each site. As in earlier reviews the major storages are at the top of the list.

Figure 19 - Ranking of top 40 sites accessed from RealTime Data website - Source WaterNSW Surface Water Database

Site	Site Name	Rank
410131	MURRUMBIDGEE RIVER AT BURRINJUCK DAM - STORAGE GAUGE	1
421078	MACQUARIE RIVER AT BURRENDONG DAM - STORAGE GAUGE	2
412010	WYANGALA DAM AT STORAGE GAUGE	3
410102	TUMUT RIVER AT BLOWERING DAM - STORAGE GAUGE	4
419041	NAMOI RIVER AT KEEPIT DAM - STORAGE GAUGE	5
418035	GWYDIR RIVER AT COPETON DAM-STORAGE GAUGE	6
416030	SEVERN RIVER AT PINDARI DAM-STORAGE GAUGE	7
401027	MURRAY RIVER AT HUME DAM - STORAGE GAUGE NO.2	8
419069	PEEL RIVER AT CHAFFEY DAM - STORAGE GAUGE	9
425003	DARLING RIVER AT BOURKE TOWN	10
419080	MANILLA RIVER AT SPLIT ROCK DAM STORAGE GAUGE	11
421148	CUDGEGONG RIVER AT WINDAMERE DAM-STORAGE GAUGE	12
410001	MURRUMBIDGEE RIVER AT WAGGA WAGGA	13
425008	DARLING RIVER AT WILCANNIA MAIN CHANNEL	14
416315A	PIKE CREEK AT GLENLYON DAM - STORAGE GAUGE	15
425012	DARLING RIVER AT MENINDEE UPSTREAM WEIR 32	16
416001	BARWON RIVER AT MUNGINDI	17
401224A	MITTA MITTA RIVER AT DARTMOUTH DAM - STORAGE GAUGE	18
421001	MACQUARIE RIVER AT DUBBO	19
425004	DARLING RIVER AT LOUTH	20
422002	BARWON RIVER AT BREWARRINA	21
425022	DARLING RIVER AT LAKE MENINDEE - STORAGE GAUGE	22
412002	LACHLAN RIVER AT COWRA	23
422001	BARWON RIVER AT DANGAR BRIDGE (WALGETT)	24
416002	MACINTYRE RIVER AT BOGGABILLA	25
419026	NAMOI RIVER AT GOANGRA	26
419001	NAMOI RIVER AT GUNNEDAH	27
425900	DARLING RIVER AT TILPA	28
410005	MURRUMBIDGEE RIVER AT NARRANDERA	29
421197	Summer Hill Creek at Third Crossing Bridge	30
410006	TUMUT RIVER AT TUMUT	31
412004	LACHLAN RIVER AT FORBES (COTTONS WEIR)	32
421192	MACQUARIE RIVER DOWNSTREAM LONG POINT	33
409025	MURRAY RIVER DOWNSTREAM YARRAWONGA WEIR	34
409023	EDWARD RIVER DOWNSTREAM OF STEVENS WEIR	35
409005	MURRAY RIVER AT BARHAM	36
410073	TUMUT RIVER AT ODDYS BRIDGE	37
412107	LAKE CARGELLIGO AT STORAGE GAUGE	38
421012	MACQUARIE RIVER AT CARINDA (BELLS BRIDGE)	39
425049	MENINDEE TOTAL STORAGE	40

Many of the monitoring sites fulfil multiple information needs. It is not currently possible to decipher what data (level, flow, water quality or rainfall parameter) is being accessed from these sites based on RealTime Data access records.

Access by public

There is widespread public accessing of information from gauging stations that monitor stream flow and storage levels. This is now possible by the rollout and expansion of the cellular mobile telemetry network both for sending and accessing information.

A recent review of 504 sites in the MDB found that 471 sites have data captured via telemetry and presented on the Web. Of the 33 not on telemetry 22 are at site not readily compatible (i.e., manually read) with the installation of telemetry.

The sites where telemetry could be considered are listed in Table 7 below. Cellular signal available coverage for potential telemetry is yet to be confirmed.

Table 7 - Sites with instrumentation where telemetry could be considered

Site ID	Site Name	Parameters Recorded
410131	MURRUMBIDGEE RIVER AT BURRINJUCK DAM - STORAGE GAUGE	Level
412108	LAKE BREWSTER AT STORAGE GAUGE	Level
424003	PAROO RIVER AT PORTERS CROSSING	Leve Flow
425020	DARLING RIVER AT LAKES WETHERELL+ TANDURE TOTAL STORAGE	Level
425021	DARLING RIVER@LAKE PAMAMAROO+COPI HOLLOW TOTAL STORAGE	Level
42510089	Darling River at Tulney	Level Conductivity Temperature
42510090	Darling River upstream Weir 32	Level Conductivity Temperature
42510091	Darling River upstream Menincourt	Level Conductivity Temperature
42510092	Darling River upstream Tulney	Level Conductivity Temperature
42510417	Darling River at Menincourt	Level Conductivity Temperature

Stream Flow and Level Potential Upgrades

Table 8 - Stream Flow and Level Potential Upgrades

Site ID	Site Name	Current Monitoring (July 2020)	Request type
410087	Murrumbidgee - BULLENBUNG CREEK AT ABOVE OLD MAN CREEK	None - Discontinued	Flow
410143	Murrumbidgee - MURRUMBIDGEE RIVER AT ERINGOARRAH	Level	Flow
410155	Murrumbidgee - TARCUTTA CREEK AT BELMORE BRIDGE	Level Rainfall	Flow, Rain
41099999	Billabong Creek significantly d/s of Darlot		Flow
41099999	Murrumbidgee Waldira		Flow
412102	Lachlan - LAKE BREWSTER INTAKE	Gaugings and Ratings	Flow
412179	Lachlan - LAKE MAROOL OUTFLOW CHANNEL	Level Velocity Flow	Flow
412180	Lachlan - Toopuntul channel	Level	Flow
412181	Lachlan - SW Floodplain wetspot	Level	Flow
412183	Lachlan - The Woodcutters	Level	Flow

Site ID	Site Name	Current Monitoring (July 2020)	Request type
41299999	Lachlan - Box Creek offtake from Merrowie Creek		Flow, Temp
41299999	Lake Forbes		Level (Volume)
418049	MALLAWA CREEK AT REGULATOR	Level Flow	Level Flow
418074	GINGHAM CHANNEL AT TERALBA	Level Flow	Level Flow
418077	Gingham Channel @ Waterhole	Level	Level
419066	Lake Goran at Hokey Pokey	Staff Gauge	Level
419091	Namoi @ Walgett	Flow	Flow
419099	COCKBURN RIVER AT D/S KOOTINGAL BRIDGE WEIR	Level Flow Conductivity Temperature	This was installed during the review process
419114	COCKBURN RIVER AT D/S KOOTINGAL BRIDGE WEIR	No Data Collected	Flow
41999999	Dungowan Creek at Thortons Road Bridge		Flow
41999999	Goonoo Goonoo Creek upstream of Calala Lane Road Bridge		Flow
41999999	West of Narrabri		Flow
42099999	Between the existing Gilgandra and Gungulman gauges.		Flow
421012	Macquarie River at Carinda (Bells Bridge)	Level Flow Cond. Temperature.	Improved technology for level flow
421138	Bogan River at Nyngan	Level	Flow
421138	Nyngan Lower weir pool	Level	Level
421153	Terrigal at u/s Marthaguy Ck	Level Flow	Level Flow
421153	Terrigal Creek at u/s Marthaguy Creek	Level Flow	Level Flow
42199999	Marthaguy Ck at u/s Terrigal Ck		Flow
42199999	Marthaguy Creek at u/s confluence with Terrigal Creek		Flow
42199999	Milmiland Creek at Carinda Road		Flow
42199999	Tyreel and Mallowa regulators		Flow
423008	Warrego River at Boera Dam	Level	Flow
425042	Lake Pamamaroo at d/s Outlet Regulator	Manual Level	Level
425043	Lake Wetherall at d/s Outlet Regulator	Manual Level	Level
425044	Lake Menindee at d/s Outlet Regulator	Level	Level

Stream Flow and Level Potential Downgrades

Table 9 - Stream Flow and Level Potential Downgrades

Site ID	Site Name	COMMENCED	CURRENT PARAMETERS
401029	MANNUS CREEK AT GLENROY NO:2	16/06/2011	Level Flow Rainfall
41010865	UMBANGO CREEK AT HUMULA ROAD BRIDGE	29/04/1988	Gaugings and Ratings
410092	CUNNINGHAMS CREEK AT NEAR HARDEN	26/05/1965	Level Flow
410160	WILLIAMS CREEK AT WHITE HILL	22/06/1988	Level Flow Rainfall
410187	TEN MILE CREEK AT HOLBROOK NO.3	29/08/2001	Level Flow
41000200	NIMBO CREEK AT DOWNSTREAM OFFTAKE	29/10/1991	Level Flow
41000208	MOLONGLO RIVER AT KOBADA	17/06/2004	Level Flow
410851	YASS RIVER AT ABOVE MACKS REEF ROAD	20/02/1976	Level Flow
410112	JINDALEE CREEK AT JINDALEE	19/08/1975	Level Flow Rainfall
410107	MOUNTAIN CREEK AT MOUNTAIN CREEK	19/05/1972	Level Flow
410152	STONY CREEK AT EDWARDSTOWN	13/04/1984	Level Flow
410088	GOODRADIGBEE RIVER AT BRINDABELLA (NO.2&NO.3-CABBANS)	4/10/1937	Level Flow
410199	TUMUT RIVER AT U/S NIMBO OFFTAKE	29/04/1977	Level Flow
41000210	COLOMBO CREEK AT COONONG WEIR	1/08/2006	Level Flow
41000269	BRUNGLE CREEK AT RED HILL NO.2	9/05/2012	Level Flow Rainfall
41000254	JUGIONG CREEK AT CUMBAMURRA NO.2	3/02/2011	Level Flow
411003	BUTMAROO CREEK AT BUTMAROO	28/09/1971	Level Flow
41200210	COOKSVALE CREEK AT UPPER-MONTANA	1/06/2011	Level Flow
412134	WATTLE CREEK AT DUDAUMAN	20/01/1988	Level Flow Rainfall
412198	MANNA CREEK AT DOWNSTREAM DRIFTWAY ROAD	1/07/2016	Gaugings and Ratings
412024	LACHLAN RIVER AT MULGUTHERIE	19/01/1926	Level Flow

Site ID	Site Name	COMMENCED	CURRENT PARAMETERS
412179	LAKE MAROOL OUTFLOW CHANNEL	14/08/2001	Level Velocity Flow
412066	ABERCROMBIE RIVER AT HADLEY NO.2	20/06/1960	Level Flow
412177	CUMBUNG SWAMP AT LAKE BUNUMBURT INFLOW	22/06/2006	Level Velocity Flow
412046	WALLAROI CREEK UPSTREAM WORRONGORRA WEIR	12/12/1916	Level Flow
413004	MURRAY RIVER AT COWANNA BEND	10/12/2004	Manual Readings Flow
416023	DEEPWATER RIVER AT BOLIVIA	10/03/1967	Level Flow Rainfall
416046	MACINTYRE RIVER AT BOONANGA BRIDGE	15/01/1981	Level Flow
416069	FRAZERS CREEK AT GLENORCHY	30/05/2002	Level Flow Rainfall
416028	BOOMI RIVER AT NEEWORRA	4/04/1968	Gaugings and Ratings
416072	WHALAN CREEK AT EURABA BRIDGE	6/07/2011	Level Flow
41801001	HORTON RIVER UPSTREAM COBBADAH CREEK	28/08/2000	Gaugings and Ratings
41801004	ROCKY CREEK UPSTREAM HORTON JUNCTION	29/08/2000	Gaugings and Ratings
41801006	PALLAL CREEK AT UPSTREAM HORTON RIVER JUNCTION	29/08/2000	Gaugings and Ratings
41801002	COBBADAH CREEK AT DEVON POINT (UPSTREAM HORTON JUNCTION)	28/08/2000	Gaugings and Ratings
418062	Moomin Creek off take	27/07/1972	Gaugings and Ratings
418088	Marshall Ponds @ Ashley	6/10/2005	Gaugings and Ratings
418092	SLAUGHTERHOUSE CREEK AT BINIGUY	25/07/2011	Level Flow
418089	Marshall Ponds @ Newell Highway	6/10/2005	Level Flow
419076	WARRAH CREEK AT OLD WARRAH	15/06/1982	Level Flow Rainfall
419086	BUNDELLA CREEK AT BUNDELLA	5/12/1995	Level Flow Rainfall
419054	SWAMP OAK CREEK AT LIMBRI	17/05/1974	Level Flow
420022	CASTLEREAGH RIVER AT COONABARABRAN NO 3	26/08/2010	Level Flow
420003	BELAR CREEK AT WARKTON (BLACKBURNS)	10/12/1951	Level Flow Rainfall

Site ID	Site Name	COMMENCED	CURRENT PARAMETERS
421180	BELL RIVER AT TANTALLON ROAD	9/02/2005	Gaugings and Ratings
421051	Blackmans Swamp Creek at Near Orange	14/07/1965	Level Flow
421186	Ploughmans Creek at Downstream Molong Road	16/06/2009	Level Flow
421197	Summer Hill Creek at Third Crossing Bridge	27/06/2013	Level Flow
421165	BENI BILLA CREEK AT DOWNSTREAM CANONBA ROAD	23/09/1994	Level Flow
421151	BORA CHANNEL AT OFFTAKE	23/06/1987	Level Flow
421185	Summer Hill Creek at Icely Road	16/06/2009	Level Flow
421050	BELL RIVER AT MOLONG	14/07/1965	Level Flow

Water Quality – Stream Flow and Water Storages

Water Quality Review Summary

The water quality review tranche included water sampling and/or field testing at rural water storages and stream flow sites. There is in the order of 190 current monitoring sites with online water quality sensor varying from water temperature only to sites with water temperature, Electrical Conductivity (EC), Dissolved Oxygen (DO) and turbidity together with water level and flow.

Water Quality Time Series Current Sites List

Table 10 - Water Quality Time Series Current Sites List

Site ID	Site Name	Current Parameters
401007	TUMBARUMBA CREEK AT TUMBARUMBA NO.2	Level Flow Conductivity Temp Rain
401008	MANNUS CREEK AT TOOMA	Level Flow Conductivity Temp Rain
401009	MARAGLE CREEK AT MARAGLE	Level Flow Conductivity Temp Rain
401012	MURRAY RIVER AT BIGGARA	Level Flow Conductivity Temp Rain
401013	JINGELLIC CREEK AT JINGELLIC	Level Flow Conductivity Temp Rain
401014	TOOMA RIVER AT PINEGROVE	Level Flow Conductivity Temp Rain
401016	WELUMBA CREEK AT THE SQUARE	Level Flow Conductivity Temp Rain
401017	MANNUS CREEK AT YARRAMUNDI	Level Flow Conductivity Temperature
401024	TUMBARUMBA CREEK AT TOOMA (BAKERS)	Level Flow Conductivity Temperature
401026	MARAGLE BACK CREEK AT GLOAMING	Level Flow Conductivity Temp Rain
409001	MURRAY RIVER AT ALBURY (UNION BRIDGE)	Level Conductivity and Temperature
409002	MURRAY RIVER AT COROWA	Level Flow Conductivity Temperature
409003	EDWARD RIVER AT DENILQUIN	level flow EC Temp DO
409005	MURRAY RIVER AT BARHAM	level flow EC Temp DO
409008	EDWARD RIVER AT OFFTAKE	Level Flow Conductivity Temperature
409013	WAKOOL RIVER AT STONEY CROSSING	level flow EC Temp DO
409014	EDWARD RIVER AT MOULAMEIN	level flow EC Temp DO
409016	MURRAY RIVER AT DOWNSTREAM HUME DAM (HEYWOODS)	Level Flow Conductivity Temperature
409017	MURRAY RIVER AT DOCTORS POINT	Level Flow Conductivity Temperature
409023	EDWARD RIVER DOWNSTREAM OF STEVENS WEIR	Level Flow Conductivity Temperature
409025	MURRAY RIVER DOWNSTREAM YARRAWONGA WEIR	Level Flow Conductivity Temperature

Site ID	Site Name	Current Parameters
409029	ESCAPE FROM MULWALA CANAL AT EDWARDS RIVER	Level Flow Conductivity Temperature
409035	EDWARD RIVER AT LEIWAH	Level Flow Conductivity Temperature
409036	MERRAN CREEK AT UPSTREAM OF WAKOOL RIVER	level flow EC Temp DO
409037	MURRAY RIVER AT HOWLONG	Level Conductivity and Temperature
409044	LITTLE MERRAN CREEK AT FRANKLINGS BRIDGE	level flow EC Temp DO
409045	WAKOOL RIVER AT WAKOOL-BARHAM ROAD	Level Flow Conductivity Temperature
409047	EDWARD RIVER AT TOONALOOK	Level Flow Conductivity Temperature
409048	NIEMUR RIVER AT BARHAM - MOULAMEIN ROAD	level flow EC Temp DO
409056	TUPPAL CREEK AT ARATULA ROAD	Level Flow Conductivity Temperature
409061	WAKOOL RIVER AT COONAMIT BRIDGE	Level Flow Conductivity Temperature
409062	WAKOOL RIVER AT GEE BRIDGE (NO.2)	Level Flow Conductivity Temperature
409075	BULLATALE CREEK AT UPSTREAM OF EDWARD RIVER	Level Flow Conductivity Temperature
409086	NIEMUR RIVER AT MALLAN SCHOOL	level flow EC Temp DO
409109	THULE CREEK AT LOWER THULE ROAD	Level Velocity Flow EC Temp DO pH
409111	BARBER CREEK AT SANDY BRIDGE ROAD	Level Velocity Flow EC Temp DO pH
409113	BARBERS CREEK AT BARBERS POOL	Level Velocity Flow EC Temp DO pH
409114	KPF OFFTAKE DOWNSTREAM OF REGULATOR	Level Velocity Flow, Temp
410001	MURRUMBIDGEE RIVER AT WAGGA WAGGA	Level Velocity Flow Cond and Temp
41000255	NORTH REDBANK CHANNEL AT GLENDEE	Level Velocity Flow, Temp
41000256	NORTH REDBANK CHANNEL AT ATHEN	Level Velocity Flow, Temp
41000270	BREDBO RIVER AT BREDBO STATION	Level Cond Temp Turbidity Rain
41000271	ALUM CREEK AT JONES PLAIN ROAD	Level Flow Cond Temp Turbid Rain
41000272	MURRUMBIDGEE RIVER UPSTREAM MICHELAGO CREEK	Level Flow Cond Temp Turb pH Rain
410004	MURRUMBIDGEE RIVER AT GUNDAGAI	Level Velocity Flow Cond and Temp
410005	MURRUMBIDGEE RIVER AT NARRANDERA	Level Velocity Flow and Temperature
410008	MURRUMBIDGEE RIVER AT D/S BURRINJUCK DAM	Level Flow Conductivity Temperature
410012	BILLABONG CREEK AT COCKETGEDONG	Level Flow Conductivity Temperature
410023	MURRUMBIDGEE RIVER AT D/S BEREMBED WEIR	Level Flow Conductivity Temperature
410024	GOODRADIGBEE RIVER AT WEE JASPER (KASHMIR)	Level Flow Conductivity Temperature
410025	JUGIONG CREEK AT JUGIONG (INVERLOCKIE)	Level Flow Conductivity Temp Rain
410039	TUMUT RIVER AT BRUNGLE BRIDGE	Level Velocity Flow and Temperature

Site ID	Site Name	Current Parameters
410040	MURRUMBIDGEE RIVER AT DOWNSTREAM MAUDE WEIR	level flow DO
410041	MURRUMBIDGEE RIVER AT DOWNSTREAM REDBANK WEIR	level flow DO
410043	HILLAS CREEK AT MOUNT ADRAH	Level Flow Conductivity Temperature
410044	MUTTAMA CREEK AT COOLAC	Level Flow Conductivity Temperature
410047	TARCUTTA CREEK AT OLD BORAMBOLA	Level Flow Conductivity Temperature
410048	KYEAMBA CREEK AT LADYSMITH	Level Flow Conductivity Temperature
410050	MURRUMBIDGEE RIVER AT BILLILINGRA	Level Flow Cond Temp Turbidity
410057	GOOBARRAGANDRA RIVER AT LACMALAC	Level Flow Conductivity Temp Rain
410061	ADELONG CREEK AT BATLOW ROAD	Level Flow Conductivity Temperature
410068	MURRUMBIDGEE RIVER AT GLENDALE	Level Flow Conductivity Temperature
410073	TUMUT RIVER AT ODDYS BRIDGE	Level Velocity Flow Cond and Temp
410081	COOMA CREEK AT COOMA NO.2 (THE GRANGE)	Level Flow Cond Temp Turbidity
410090	YASS RIVER AT GUNDAROO	Level Flow Conductivity Temperature
410091	BILLABONG CREEK AT WALBUNDRIE	Level Flow Conductivity Temperature
410093	OLD MAN CREEK AT KYWONG (TOPREEDS)	Level Flow Conductivity Temperature
410097	BILLABONG CREEK AT ABERFELDY	Level Flow Conductivity Temperature
410103	HOULAGHANS CREEK AT DOWNSIDE	Level Flow Conductivity Temperature
41010309	FOREST CREEK AT OFFTAKE	Level Velocity Flow and Temperature
410108	DRAINAGE CANAL 800 AT OUTFALL	Level Flow Conductivity Temperature
41010891	TUMUT RIVER AT MURRUMBIDGEE JUNCTION	Temperature
41010969	INLET CHANNEL AT UPSTREAM TOMBULLEN STORAGE	Level Velocity Flow, Temp
410110	DRAINAGE CANAL 500 AT OUTFALL	Level Flow Conductivity Temperature
410130	MURRUMBIDGEE RIVER AT DOWNSTREAM BALRANALD WEIR	level flow EC Temp DO
410133	COLEAMBALLY OUTFALL DRAIN AT NEAR BUNDY	Level Flow Conductivity Temperature
410134	BILLABONG CREEK AT DARLOT	Level Flow Cond Temp Turbidity
410141	MICALIGO CREEK AT MICHELAGO	Level Flow Cond Temp Turbidity
410148	FOREST CREEK AT WARRISTON WEIR	Level Flow Conductivity Temperature
410156	KYEAMBA CREEK AT BOOK	Level Flow Conductivity Temp Rain
410168	BILLABONG CREEK AT DOWNSTREAM HARTWOOD WEIR	Level Flow Conductivity Temperature
410169	YANCO CREEK AT YANCO BRIDGE	Level Flow Conductivity Temperature
410170	BILLABONG CREEK AT UPSTREAM INNES BRIDGE	Level Flow Conductivity Temperature
410176	YASS RIVER AT U/S BURRINJUCK DAM (RIVERVIEW)	Level Flow Conductivity Temperature
410182	BILLABONG CREEK AT HILLVIEW	Level Flow Conductivity Temperature

Site ID	Site Name	Current Parameters
410183	BILLABONG CREEK AT PARKSIDE	Level Flow Conductivity Temperature
410185	NOWRANIE CREEK AT DOWNSTREAM OFFTAKE BILLABONG CREEK	Level Conductivity and Temperature
410186	BILLABONG CREEK DOWNSTREAM TEN MILE & MOUNTAIN CREEKS	Level Flow Conductivity Temperature
410191	COLEAMBALLY CATCHMENT DRAIN AT OUTFALL INTO YANCO CREEK	Level Flow Conductivity Temperature
410195	MURRUMBIDGEE RIVER AT UPSTREAM GOBARRALONG BRIDGE	Level Flow Conductivity Temperature
412002	LACHLAN RIVER AT COWRA	Level Flow Conductivity Temperature
41200208	CROWTHER CREEK AT WATERVALE	Level Flow Conductivity Temperature
41200209	ABERCROMBIE RIVER AT ABERCROMBIE NO.2	Level Flow Conductivity Temp Rain
412004	LACHLAN RIVER AT FORBES (COTTONS WEIR)	Level Flow Conductivity Temperature
412005	LACHLAN RIVER AT BOOLIGAL	Level Flow Conductivity Temperature
412006	LACHLAN RIVER AT CONDOBOLIN BRIDGE	Level Flow Conductivity Temperature
412027	LACHLAN RIVER AT REIDS FLAT	Level Flow Conductivity Temperature
412029	BOOROWA RIVER AT PROSSERS CROSSING	Level Flow Conductivity Temp Rain
412030	MANDAGERY CREEK UPSTREAM EUGOWRA (SMITHFIELD)	Level Flow Conductivity Temperature
412038	LACHLAN RIVER U/S WILLANDRA WEIR	Level Flow Conductivity Temperature
412067	LACHLAN RIVER DOWNSTREAM WYANGALA DAM	Level Flow Conductivity Temperature
412077	BELUBULA RIVER AT CARCOAR	Level Flow Conductivity Temperature
412101	LAKE CARGELLIGO INTAKE UPSTREAM LAKE CARGELLIGO WEIR	Level Flow Temperature
412154	CUMBUNG SWAMP AT END OF SYSTEM	Level Conductivity and Temperature
412175	HOVELLS CREEK AT HOVELLS CREEK NO.2	Level Flow Conductivity Temperature
412177	CUMBUNG SWAMP AT LAKE BUNUMBURT INFLOW	Level Velocity Flow, Temp
412179	LAKE MAROOL OUTFLOW CHANNEL	Level Velocity Flow
412194	LACHLAN RIVER AT FOUR MILE WEIR	Level Flow Conductivity Temperature
412195	BELUBULA RIVER AT LYNDON (UPSTREAM CANOWINDRA)	Level Flow Conductivity Temperature
413001	MURRAY RIVER AT MALLEE CLIFFS NO.1 DOWNSTREAM	Conductivity and Temperature
413002	MURRAY RIVER AT MALLEE CLIFFS NO.2 UPSTREAM	Level Conductivity and Temperature
41310022	MURRAY RIVER AT COLIGNAN PONTOON	Conductivity and Temperature
41310023	MURRAY RIVER AT MALLEE CLIFFS UPSTREAM PONTOON	Conductivity and Temperature
41310024	MURRAY RIVER AT MALLEE CLIFFS DOWNSTREAM PONTOON	Conductivity and Temperature
41310025	MURRAY RIVER AT REDCLIFFS PONTOON	Conductivity and Temperature

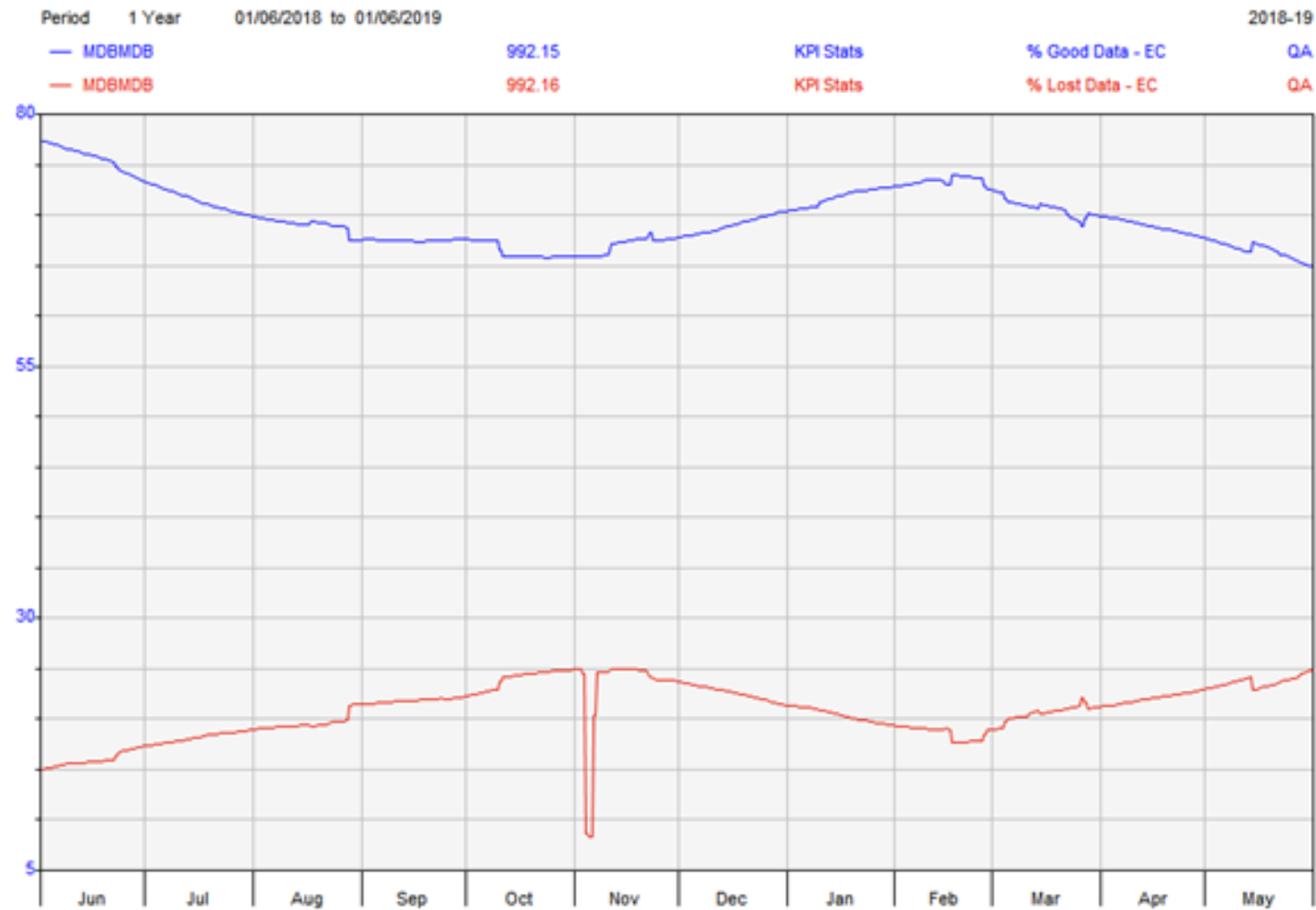
Site ID	Site Name	Current Parameters
41310026	MURRAY RIVER AT CHAFFEY'S GRAVEYARD PONTOON	Conductivity and Temperature
41310027	MURRAY RIVER AT MERBEIN PONTOON	Conductivity and Temperature
41310028	MURRAY RIVER AT CURLWAA PONTOON	Conductivity and Temperature
416001	BARWON RIVER AT MUNGINDI	Level Flow Conductivity Temperature
416012	MACINTYRE RIVER AT HOLDFAST (YELARBON CROSSING)	Level Flow Conductivity Temperature
416016	MACINTYRE RIVER AT INVERELL (MIDDLE CREEK)	Level Flow Conductivity Temp Rain
416040	DUMARESQ RIVER AT GLENARBON WEIR	Level Flow Conductivity Temp Rain
418004	GWYDIR RIVER AT YARRAMAN BRIDGE	Level Flow Conductivity Temperature
418008	GWYDIR RIVER AT BUNDARRA	Level Flow Rainfall Temperature
418017	MYALL CREEK AT MOLROY	Level Flow Conductivity Temperature
418058	MEHI RIVER AT BRONTE	Level Flow Conductivity Temperature
419001	NAMOI RIVER AT GUNNEDAH	Level Flow Conductivity Temperature
419003	NARRABRI CREEK AT NARRABRI	Level Flow Conductivity Temperature
419005	NAMOI RIVER AT NORTH CUERINDI	Level Flow Temperature
419007	NAMOI RIVER AT DOWNSTREAM KEEPIT DAM	Level Flow Temperature
41901010	QUIPOLLY CK AT U/S KAMILAROI HIGHWAY	Level Temperature
419016	COCKBURN RIVER AT MULLA CROSSING	Level Flow Conductivity Temperature
419024	PEEL RIVER at upstream PARADISE WEIR	Level Flow Conductivity Temperature
419026	NAMOI RIVER AT GOANGRA	Level Flow Conductivity Temperature
419032	COXS CREEK AT BOGGABRI	Level Flow Conductivity Temp Rain
419045	PEEL RIVER D/S CHAFFEY DAM	Level Flow Temperature
419084	MOOKI RIVER AT RUVIGNE	Level Flow Conductivity Temperature
419097	GOONOO GOONOO CREEK AT MEADOWS LANE	Level Flow Cond Temp Turbidity
419099	COCKBURN RIVER AT KOOTINGAL	Level Flow Conductivity Temperature
420017	CASTLEREAGH RIVER AT HIDDEN VALLEY	Level Flow Conductivity Temperature
420020	CASTLEREAGH RIVER AT GUNGALMAN	Level Flow Conductivity Temperature
421011	MARTHAGUY CREEK AT CARINDA	Level Flow Conductivity Temperature
421012	MACQUARIE RIVER AT CARINDA (BELLS BRIDGE)	Level Flow Conductivity Temperature
421018	BELL RIVER AT NEWREA	Level Flow Conductivity Temperature
421019	CUDGEGONG RIVER AT YAMBLE BRIDGE	Level Flow Conductivity Temperature
421023	BOGAN RIVER AT GONGOLGON	Level Flow Conductivity Temperature
421026	TURON RIVER AT SOFALA	Level Flow Conductivity Temperature
421039	BOGAN RIVER AT NEURIE PLAINS	Level Flow Conductivity Temperature
421040	MACQUARIE RIVER AT DOWNSTREAM BURRENDONG DAM	Level Flow Conductivity Temperature
421048	LITTLE RIVER AT OBLEY NO.2	Level Flow Conductivity Temperature

Site ID	Site Name	Current Parameters
421079	CUDGEGONG RIVER AT D/S WINDAMERE DAM	Level Flow Conductivity Temperature
421090	MACQUARIE RIVER AT D/S MAREBONE WEIR	Level Flow Conductivity Temperature
421107	MARRA CREEK AT BILLYBINGBONE BRIDGE	Level Flow Conductivity Temperature
421127	MACQUARIE RIVER AT BAROONA	Level Flow Conductivity Temperature
421191	MACQUARIE RIVER AT YARRACOONA	Level Flow Conductivity Temperature
421196	Outflow Downstream of Suma Park Dam	level flow DO Temp
422001	BARWON RIVER AT DANGAR BRIDGE (WALGETT)	Level Flow Conductivity Temperature
422002	BARWON RIVER AT BREWARRINA	Level Flow Conductivity Temperature
422003	BARWON RIVER AT COLLARENEBRI MAIN CHANNEL	Level Flow Conductivity Temperature
422015	CULGOA RIVER AT BRENDA	Level Flow Conductivity Temperature
422016	NARRAN RIVER AT WILBY (BELVEDERE)	Level Flow Conductivity Temp Rain
422027	BARWON RIVER AT GEERA (DOWNSTREAM MACQUARIE JUNCTION)	Level Flow Conductivity Temperature
422029	NARRAN RIVER AT NARRAN PARK	Level Flow Conductivity Temperature
422030	NARRAN RIVER AT NEW ANGLEDPOOL NO. 2	Level Flow Conductivity Temperature
422031	NARRAN RIVER @ BUNDAH	Level Flow Conductivity Temp Rain
422034	NARRAN RIVER @ BACK LAKE	Level Flow Conductivity Temp Rain
423002	WARREGO RIVER AT FORDS BRIDGE BYWASH	Level Flow Conductivity Temperature
423004	WARREGO RIVER AT BARRINGUN NO. 2	Level Flow Conductivity Temperature
423005	CUTTABURRA CHANNEL AT TURRA	Level Flow Conductivity Temperature
425003	DARLING RIVER AT BOURKE TOWN	Level Flow Conductivity Temperature
425004	DARLING RIVER AT LOUTH	Level Flow Conductivity Temperature
425005	DARLING RIVER AT POONCARIE	Level Flow Conductivity Temperature
425007	DARLING RIVER AT BURTUNDY	level flow EC Temp DO
425008	DARLING RIVER AT WILCANNIA MAIN CHANNEL	Level Flow Conductivity Temperature
425011	GREAT DARLING ANABRANCH AT BULPUNGA	Level Flow Conductivity Temperature
425012	DARLING RIVER AT MENINDEE UPSTREAM WEIR 32	Level Flow Conductivity Temperature
425013	GREAT DARLING ANABRANCH AT WYCOT	Level Flow Conductivity Temperature
425014	OUTLET CHANNEL AT LAKE CAWNDILLA	Level Flow Conductivity Temperature
425019	REDBANK CREEK AT DOWNSTREAM PACKERS CROSSING	Level Flow Conductivity Temperature
425035	DARLING RIVER AT DOWNSTREAM DEAD HORSE CREEK	Level Flow Conductivity Temperature
425036	DARLING RIVER AT GLEN VILLA	Level Flow Conductivity Temperature
425037	DARLING RIVER AT DOWNSTREAM WEIR 19A	Level Flow Conductivity Temperature
425038	DARLING RIVER AT MYANDETTA	Level Flow Conductivity Temperature
425039	DARLING RIVER AT WARRAWEENA (D/S CULGOA JUNCTION)	Level Flow Conductivity Temperature

Site ID	Site Name	Current Parameters
42510089	Darling River at Tulney	Level Conductivity and Temperature
42510090	Darling River upstream Weir 32	Level Conductivity and Temperature
42510091	Darling River upstream Menincourt	Level Conductivity and Temperature
42510092	Darling River upstream Tulney	Level Conductivity and Temperature
42510417	Darling River at Menincourt	Level Conductivity and Temperature
425900	DARLING RIVER AT TILPA	Level Flow Conductivity Temperature

Water Quality Time Series Performance Review

Figure 20 - Percentages of good and lost EC data - MDB Sites



The frequency of data capture was assessed for a range of water quality parameters. The percentage of good quality EC data is on average at an 70% data capture rate with approximately 20% lost or not available (see Notes below).

** Note that sites must have water level, rating tables and EC data for this report to give a result. Therefore, sites where discharge is derived directly from a velocity sensor are not included.

Water Temperature Performance Results

Figure 23 - Example of water temperature site specific performance report

A	B	C	D	E	F
WaterNSW	HYPARTST V30 Output 31/10/2019				
Partitioned Statistics Report				Sites	177
Var Water Temperature in Degrees Celsius (daily instantaneous values)				Average good data > 0	87%
Where Discharge Rate in Megalitres/Day (daily instantaneous values) > 0.0				Average Time Flowing	84%
Period	%Good	%Selected			
Site 401007 - TUMBARUMBA CREEK AT TUMBARUMBA NO.2					
Jun 2018 - May 2019	100.0%	100.0%	13.5	4.4	7.9
All Data	100.00%	100.00%	13.0	18.5	27.2

Over the audit period (1 June 2018 to 1 June 2019) 177** sites were flowing 84% of the time using a daily sampling duration. In this period 13% of the Water Temperature data is coded as missing.

** Note that sites must have aligned water level, water temperature data and rating tables for this report to give a result. Therefore, sites where discharge is derived directly from an acoustic Doppler velocity sensor are not included.

Water Quality Time Series Potential Upgrades

Existing or historic sites were identified for potential upgrade with water quality instrumentation.

Table 11 - Water Quality Time Series Potential Upgrades

Site ID	Site Name	Current Parameters	Potential Upgrade	Uses
401003	Tooma river @ Warbrook	None - Discontinued	Level Flow Electrical Conductivity Water Temperature	Support salinity catchment modelling
409006	Murray @ Gulpa	Level Only	Electrical Conductivity Water Temperature and Dissolved Oxygen	Support salinity catchment modelling and Part of WQ Review
409008	Edward River @ Offtake	Level Flow Conductivity Temperature	Dissolved Oxygen	Part of WQ Review
409019	Wakool River @ Offtake regulator	Level Flow	Dissolved Oxygen	Part of WQ Review
409020	Yallakool creek @ Offtake	Level Flow	Dissolved Oxygen	Part of WQ Review
409023	Edward River downstream of Stevens Weir	Level Flow Conductivity Temperature	Dissolved Oxygen	Part of WQ Review

Site ID	Site Name	Current Parameters	Potential Upgrade	Uses
409024	Colligen Creek @ below regulator	Level	Level Flow and Dissolved Oxygen	Part of WQ Review
409025	Murray River downstream Yarrawonga Weir	Level Flow Conductivity Temperature	Dissolved Oxygen	Part of WQ Review
409029	Escape from Mulwala Canal @ Edwards River	Level Flow Conductivity Temperature	Dissolved Oxygen	Part of WQ Review
409030	Gulpa Creek at Offtake	Level Flow	Dissolved Oxygen	Part of WQ Review
409047	Edward River @ Toonalook	Level Flow Conductivity Temperature	Dissolved Oxygen	Part of WQ Review and Environ water management - Risk management
409056	Tuppall Creek @ Aratula Road	Level Flow Conductivity Temperature	Dissolved Oxygen	Part of WQ Review
409060	North Deniliquin Drain @ Hay Rd.	None - Discontinued	Flow Electrical Conductivity Water Temperature	Support salinity catchment modelling
409061	Wakool River @ Coonamit Bridge	Level Flow Conductivity Temperature	Dissolved Oxygen	Part of WQ Review
409062	Wakool River @ Gee Bridge (No.2)	Level Flow Conductivity Temperature	Dissolved Oxygen	Part of WQ Review and Environ water management - Risk management
409067	Deniboota Canal Escape U/S top of bridge Lashbrooks Rd.	None - Discontinued	Flow Electrical Conductivity Water Temperature	Support salinity catchment modelling
409075	Bullatale Creek @ upstream of Edward River	Level Flow Conductivity Temperature	Dissolved Oxygen	Part of WQ Review
409098	Waddy Creek @ downstream of regulator.	Level Flow	Dissolved Oxygen	Part of WQ Review
409107	Saint Helena creek @ Downstream regulator	Level Flow	Dissolved Oxygen	Part of WQ Review
409114	KPF offtake downstream of regulator	Level Velocity Flow	Dissolved Oxygen	Part of WQ Review
410078	Murrumbidgee River @ Carrathool	Discontinued	Level and flow	Part of WQ Review

Site ID	Site Name	Current Parameters	Potential Upgrade	Uses
412008	Lachlan - LAKE CREEK AT LAKE CARGELLIGO OUTLET	Gaugings and Ratings	Dissolved Oxygen	Part of WQ Review and Environ water management - Risk management
412036	Lachlan - LACHLAN RIVER D/S JEMALONG WEIR	Gaugings and Ratings	Water Temperature	Part of WQ Review
412154	Lachlan - CUMBUNG SWAMP AT END OF SYSTEM	Level Conductivity Temperature	Dissolved Oxygen	Environmental water planning and event management.
412177	Lachlan - Bunumbert Inflow	Level Velocity Flow	Dissolved Oxygen and Temperature	Part of WQ Review
412194	Lachlan - LACHLAN at 4 MILE	Level Flow Conductivity Temperature	Dissolved Oxygen	Part of WQ Review
421038	Cudgegong River@Rylestone	Discontinued	Level and flow for Salinity	Support salinity catchment modelling
421077	Macquarie River U/S Spillway Burrendong Dam	No data collected	Level and flow for WQ Sampling	Part of WQ Review
421176	Little River @ Arthurville	Level	Flow Electrical Conductivity Water Temperature	Support salinity catchment modelling
422014	Bokhaara River @ Goodooga	Discontinued	Level and flow for Salinity	Support salinity catchment modelling
425005	Lower Darling - DARLING RIVER AT POONCARIE	Level Flow Conductivity Temperature	Dissolved Oxygen	Part of WQ Review
425008	Lower Darling - DARLING RIVER AT WILCANNIA MAIN CHANNEL	Level Flow Conductivity Temperature	Dissolved Oxygen	Part of WQ Review
425012	Lower Darling - DARLING RIVER AT MENINDEE UPSTREAM WEIR 32	Level Flow Conductivity Temperature	Dissolved Oxygen	Part of WQ Review
4210123	Abercrombie River @ camping area	No data currently being collected	Level and flow to support WQ programs	Part of WQ Review
40910087	Murray River at Moama (Echuca)	No data currently being collected	Level, Flow Electrical Conductivity and Temperature	Support salinity catchment modelling
41000209	YANCO CREEK AT WIRAKI	No data currently being collected	Dissolved Oxygen	Part of WQ Review

Site ID	Site Name	Current Parameters	Potential Upgrade	Uses
41000281	Murrumbidgee - MURRUMBIDGEE RIVER AT CARRATHOOL BRIDGE	No data currently being collected	Level flow Water Temperature Dissolved Oxygen	Part of WQ Review Blackwater
41010143	Murrumbidgee River @ Waldaria	No data currently being collected	New Level and flow to support WQ programs	Part of WQ Review
41010395	Murrumbidgee River @ Roach Road	No data currently being collected	New Level and flow to support WQ programs	Part of WQ Review
41010809	Hillis Ck @ Mundarlo	No data currently being collected	New Level and flow to support WQ programs	Part of WQ Review
41010890	Adelong Ck @ Bereena	No data currently being collected	New Level and flow to support WQ programs	Part of WQ Review
41010901	Murrumbidgee River at Balranald Weir Storage	No data currently being collected	New Level and flow to support WQ programs	Part of WQ Review
41010904	Murrumbidgee River at Berembded Weir - storage gauge	No data currently being collected	New Level and flow to support WQ programs	Part of WQ Review
41010922	Murrumbidgee River at Gogeldrie Weir - storage gauge	Externally Operated	New Level and flow to support WQ programs	Part of WQ Review
41010924	Goobarragandra River @ Little River Road	No data currently being collected	New Level and flow to support WQ programs	Part of WQ Review
41610044	MACINTYRE RIVER AT SALISBURY BRIDGE (BOGGABILLA)	No data currently being collected	New Level and flow to support WQ programs	Part of WQ Review
41610079	SEVERN RIVER AT STRATHBOGIE BRIDGE (INVERELL ROAD)	No data currently being collected	New Level and flow to support WQ programs	Part of WQ Review
41610152	GIL CREEK AT COLLARENEBRI ROAD BRIDGE	No data currently being collected	New Level and flow to support WQ programs	Part of WQ Review
41810006	Laura Creek at upstream Bundara	No data currently being collected	New Level and flow to support WQ programs	Part of WQ Review
41810033	Myall Creek at Sheep Station Creek Road	No data currently being collected	New Level and flow to support WQ programs	Part of WQ Review
41810058	Horton River @ Elcombe Road bridge	No data currently being collected	New Level and flow to support WQ programs	Part of WQ Review
42110101	Macquarie River at Molong Rai Bridge	No data currently being collected	New Level and flow to support WQ programs	Part of WQ Review
42110170	Turon River @ Bathurst Point	No data currently being collected	New Level and flow to support WQ programs	Part of WQ Review

Site ID	Site Name	Current Parameters	Potential Upgrade	Uses
42110171	Fish River @ Hazelgrove	No data currently being collected	New Level and flow to support WQ programs	Part of WQ Review
410new	Murrumbidgee - Redbank Weir Pool (~200m upstream of weir wall)	No data currently being collected	Thermistor chain	Weir Pool Stratification
410new	Murrumbidgee - Maude Weir Pool (~200m upstream of weir wall)	No data currently being collected	Thermistor chain	Wei Pool Stratification
410new	Murrumbidgee - Balranald Weir Pool (~200m upstream of weir wall)	No data currently being collected	Thermistor chain	Weir Pool Stratification
412new	Lachlan - Wallaroi/Wallamundry @ Woolshed Weir	No data currently being collected	New Level Flow and Dissolved Oxygen	Part of WQ Review Blackwater
412new	Lachlan - BOX Creek offtake from Merrowie Creek	No data currently being collected	New Level Flow and Temperature	Part of WQ Review Blackwater

Water Quality Time Series Potential Downgrades

Table 12 - Water Quality Time Series Potential Downgrades

Site ID	Site Name	Latitude	Longitude	Comments
Nil	Nil			Nil

No Water Quality Time Series sites were ranked for potential downgrade or closure.

Water Quality Discrete Sampling Current Sites List

Water quality samples are collected and analysed at storage and river sites, predominantly to understand whether water is suitable for domestic use, watering stock, irrigation and recreation.

Table 13 - Water Quality Discrete Sampling Current Sites List

Site ID	Site Name	Latitude	Longitude	Uses
DBLO01	Blowering Station 1 (Dam Wall)	-35.401	148.244	Recreation, stock, domestic, irrigation
DBLO02	Blowering Downstream	-35.389	148.248	Recreation, stock, domestic, irrigation
DBRJ01	Burrinjuck Downstream	-35.001	148.574	Recreation, stock, domestic, irrigation

Site ID	Site Name	Latitude	Longitude	Uses
DBRJ09	Burrinjuck Station 1 (Dam Wall)	-35.002	148.589	Recreation, stock, domestic, irrigation
DBRJ10	Burrinjuck Waters State Park	-34.982	148.624	Recreation, stock, domestic, irrigation
DBRJ11	Burrinjuck Woolgarlo	-34.897	148.736	Recreation, stock, domestic, irrigation
DBRJ12	Burrinjuck Goodhope	-34.926	148.807	Recreation, stock, domestic, irrigation
DBRW03	Lake Brewster Regulator C	-33.402	145.980	Stock, domestic, irrigation
DBUR01	Burrendong Dam Station 1 (Dam Wall)	-32.667	149.112	Recreation, stock, domestic, potable
DBUR02	Burrendong Downstream (Macquarie River)	-32.636	149.083	Recreation, stock, domestic, potable
DBUR03	Burrendong Mookerawa	-32.770	149.159	Recreation, stock, domestic, potable
DBUR04	Burrendong Cudgegong	-32.408	149.334	Recreation, stock, domestic, potable
DCAR01	Carcoar Dam Station 1 (Dam Wall)	-33.618	149.178	Recreation, stock, domestic, irrigation
DCAR02	Carcoar Downstream (Belubula River)	-33.613	149.146	Recreation, stock, domestic, irrigation, potable
DCHA01	Chaffey Downstream	-31.342	151.144	Recreation, stock, domestic, potable, irrigation
DCHA02	Chaffey Dam Station 2 (Mid storage)	-31.348	151.138	Recreation, stock, domestic, potable, irrigation
DCHA05	Chaffey Dam Station 1 (Aerator)	-31.346	151.140	Recreation, stock, domestic, potable, irrigation
DCOP01	Copeton Dam Station 1 (Dam Wall)	-29.905	150.923	Recreation, stock, domestic, potable, irrigation
DCOP02	Copeton Downstream (Gwydir River)	-29.912	150.907	Recreation, irrigation, stock and domestic
DCOP03	Copeton Dam Kiosk	-29.913	150.986	Recreation, stock, domestic, potable, irrigation
DCOP04	Copeton Dam Wonulla	-29.933	150.978	Recreation, stock, domestic, potable, irrigation
DCOP05	Copeton Dam Northern Foreshore	-29.889	150.995	Recreation, stock, domestic, potable, irrigation
DCRG01	Lake Cargelligo Outlet – Lake Creek	-33.243	146.406	Recreation, stock, domestic, irrigation
DCRG03	Lake Cargelligo Boatshed	-33.300	146.381	Recreation, stock, domestic, irrigation, potable
DCRG04	Lake Cargelligo Weir	-33.201	146.453	Recreation, stock, domestic, irrigation, potable

Site ID	Site Name	Latitude	Longitude	Uses
DCRG05	Lake Cargelligo intake downstream of Curlew Waters	-33.202	146.457	Recreation, stock, domestic, irrigation, potable
DCRG06	Lake Cargelligo Lachlan River d/s Lake Carlweir			Recreation, stock, domestic, irrigation, potable
DKEE01	Keepit Dam Station 1 (Dam Wall)	-30.879	150.493	Recreation, irrigation, stock and domestic
DKEE02	Keepit Downstream (Namoi River)	-30.887	150.488	Recreation, irrigation, stock and domestic
DKEE03	Keepit Recreation Area	-30.889	150.503	Recreation, irrigation, stock and domestic
DLH001	Lake Hume at Heywoods	-36.071	147.064	Recreation, stock, domestic, irrigation, potable
DLH002	Hume Dam Lake Hume Resort	-36.103	147.041	Recreation, stock, domestic, irrigation, potable
DLH003	HUME DAM AT EBDEN	-36.147	147.052	Recreation, stock, domestic, irrigation, potable
DLH004	HUME DAM AT DAM WALL	-36.108	147.034	Recreation, stock, domestic, irrigation, potable
DLOS06	Lachlan River @ Willandra Weir	-33.350	145.876	Recreation, stock, domestic, irrigation
DPIN01	Pindari Dam Station 1 (Dam Wall)	-29.386	151.247	Recreation, stock, domestic, potable, irrigation
DPIN02	Pindari Downstream (Severn River)	-29.385	151.243	Recreation, stock, domestic, potable, irrigation
DPIN03	Pindari Dam Station 2/3	-29.398	151.278	Recreation, stock, domestic, potable, irrigation
DPIN04	Pindari Dam Station Boat Ramp	-29.390	151.255	Recreation, stock, domestic, potable, irrigation
DSPR01	Split Rock Downstream (Manilla River)	-30.587	150.689	Recreation, stock, domestic, potable, irrigation
DSPR05	Split Rock Dam Station 1 (Dam Wall)	-30.578	150.700	Recreation, stock, domestic, potable, irrigation
DSPR12	Split Rock Recreation Area	-30.554	150.685	Recreation, stock, domestic, potable, irrigation
DTOO01	Toonumbar Dam Station 1 (Dam Wall)	-28.619	152.794	Recreation, stock, domestic, irrigation
DTOO02	Toonumbar Dam Station 2	-28.607	152.781	Recreation, stock, domestic, irrigation
DTOO03	Toonumbar Downstream	-28.623	152.799	Recreation, stock, domestic, irrigation
DWIN01	Windamere Dam Station 1 (Dam Wall)	-32.726	149.768	Recreation, stock, domestic, irrigation
DWIN02	Windamere Downstream (Cudgegong River)	-32.708	149.754	Recreation, stock, domestic, irrigation

Site ID	Site Name	Latitude	Longitude	Uses
DWIN03	42110024 - Windamere Station 4	-32.807	149.829	Recreation, stock, domestic, irrigation
DWYA01	41210002 - Wyangala Junction Lachlan & Abercrombie	-33.947	149.020	Recreation, stock, domestic, irrigation
DWYA02	41210003 - Wyangala Junction Lachlan & Sandy Ck	-33.999	149.062	Recreation, stock, domestic, irrigation
DWYA04	412067 - Wyangala Dam Downstream	-33.983	148.936	Recreation, irrigation, stock and domestic
DWYA05	41210005 - Wyangala Abercrombie R	-33.888	149.119	Recreation, stock, domestic, irrigation
DWYA06	41210007 - Wyangala Inland Waters Park	-33.959	148.964	Recreation, stock, domestic, irrigation
DWYA08	41210001 - Wyangala Dam Wall Station 1	-33.969	148.952	Recreation, stock, domestic, irrigation
N1000	409001 - Murray River at Union Bridge (Albury)	-36.092	146.907	Recreation, stock, domestic, irrigation, potable
N1001	409002 - Murray River at Corowa	-36.008	146.395	Recreation, stock, domestic, irrigation, potable
N1002	409003 - Edward River at Deniliquin	-35.530	144.966	Recreation, stock, domestic, irrigation, potable
N1003	409005 - Murray River at Barham	-35.630	144.124	Recreation, stock, domestic, irrigation, potable
N1004	409013 - Wakool River at Stoney Crossing	-35.038	143.570	Recreation, stock, domestic, irrigation
N1005	409014 - Edward River at Moulamein	-35.090	144.031	Recreation, stock, domestic, irrigation, potable
N1006	409015 - Gulpa Creek at Mathoura	-35.815	144.918	Recreation, stock, domestic, irrigation
N1007	409025 - Murray River D/S Yarrawonga Weir	-36.011	145.994	Recreation, stock, domestic, irrigation, potable
N1008	409026 - Mulwala Canal at the offtake	-35.983	146.012	Recreation, stock, domestic, irrigation
N1009	409034 - Wakool River at Kyalite	-34.950	143.482	Recreation, stock, domestic, irrigation
N1010	409045 - Wakool River at Wakool-Barham Road	-35.511	144.210	Recreation, stock, domestic, irrigation
N1013	409202 - Murray River at Tocumwal	-35.815	145.560	Recreation, stock, domestic, irrigation, potable
N1014	410004 - Murrumbidgee River at Gundagai	-35.075	148.108	Recreation, stock, domestic, irrigation
N1015	410016 - Billabong Creek at Jerilderie	-35.353	145.736	Recreation, stock, domestic, irrigation

Site ID	Site Name	Latitude	Longitude	Uses
N1017	Murrumbidgee River at Mittagang Crossing (Cooma)	-36.164	149.095	Recreation, stock, domestic, irrigation
N1018	410078 - Murrumbidgee River at Carathool	-34.449	145.417	Recreation, stock, domestic, irrigation
N1019	410082 - Murrumbidgee River at Gogeldrie Weir	-34.615	146.256	Recreation, stock, domestic, irrigation
N1020	410091 - Billabong Creek at Walbundrie	-35.693	146.724	Recreation, stock, domestic, irrigation
N1021	410134 - Billabong Creek at Darlot	-35.044	144.446	Recreation, stock, domestic, irrigation
N1022	412004 - Lachlan River at Cottons Weir (Forbes)	-33.411	147.991	Recreation, stock, domestic, irrigation
N1023	412005 - Lachlan River at Booligal	-33.869	144.881	Recreation, stock, domestic, irrigation
N1024	412006 - Lachlan River at Condobolin Bridge	-33.091	147.148	Recreation, stock, domestic, irrigation
N1025	412039 - Lachlan River at Hillston	-33.487	145.504	Recreation, domestic, stock, irrigation
N1026	412045 - Lachlan River at Coorong	-34.218	144.462	Recreation, domestic, stock, irrigation
N1027	414206 - Murray River at Merbein	-34.173	142.082	Recreation, stock, domestic, irrigation, potable
N1028	414209 - Murray River U/S Euston Weir	-34.600	142.759	Recreation, stock, domestic, irrigation, potable
N1029	416001 - Barwon River at Mungindi	-28.976	148.985	Recreation, stock, domestic, irrigation, potable
N1030	Macintyre River at Inverell (Middle Creek)	-29.798	151.134	Recreation, irrigation, stock and domestic
N1031	416065 - Macintyre River at Boggabilla Weir	-28.590	150.362	Recreation, stock, domestic, potable, irrigation
N1032	419057 - Namoi River at Walgett	-30.015	148.121	Recreation, stock, irrigation, potable
N1033	421001 - Macquarie River at Dubbo	-32.271	148.602	Recreation, irrigation, stock, domestic, potable
N1034	421023 - Bogan River at Gongolgon	-30.348	146.901	Recreation, stock, domestic, irrigation, potable
N1035	422001 - Barwon River at Dangar Bridge (Walgett)	-30.015	148.068	Recreation, stock, domestic, irrigation, potable
N1036	422002 - Barwon River at Brewarrina	-29.948	146.868	Recreation, stock, domestic, irrigation, potable
N1037	422003 - Barwon River at Collarenebri	-29.547	148.577	Recreation, stock, domestic, irrigation, potable
N1038	425003 - Darling River at Bourke	-30.087	145.937	Recreation, stock, domestic, irrigation, potable

Site ID	Site Name	Latitude	Longitude	Uses
N1039	425004 - Darling River at Louth	-30.533	145.114	Recreation, stock, domestic, irrigation
N1040	425005 - Darling River at Pooncarie	-33.389	142.570	Recreation, stock, domestic, irrigation, potable
N1041	425007 - Darling River at Burtundy	-33.743	142.271	Recreation, stock, domestic, irrigation
N1042	425008 - Darling River at Wilcannia	-31.560	143.380	Recreation, stock, domestic, irrigation, potable
N1043	425026 - Darling River at Tolarno	-32.784	142.389	Recreation, stock, domestic, irrigation
N1044	425030 - Darling River at Bourke Weir	-30.084	145.588	Recreation, stock, domestic, irrigation
N1045	425900 - Darling River at Tilpa	-30.934	144.419	Recreation, stock, domestic, irrigation
N1050	40910087 - Murray River at Moama	-36.121	144.755	Recreation, stock, domestic, irrigation, potable
N1051	40910088 - Murray River at Cobram	-35.917	145.670	Recreation, stock, domestic, irrigation, potable
N1052	40910089 - Murray River at Picnic Point	-35.853	145.000	Recreation, stock, domestic, irrigation, potable
N1053	40910090 - Edward River at Old Morago	-35.380	144.654	Recreation, stock, domestic, irrigation, potable
N1054	40910118 - Murray River at Murray Downs	-35.346	143.589	Recreation, stock, domestic, irrigation, potable
N1055	40910127 - Murray River at Tooleybuc	-35.030	143.336	Recreation, stock, domestic, irrigation, potable
N1056	41010343 - Murrumbidgee River at Hay weir Buoy	-34.524	144.713	Recreation, stock, domestic, irrigation
N1057	41010361 - Murrumbidgee River at Redbank weir Buoy	-34.375	143.784	Recreation, stock, domestic, irrigation, potable
N1058	41010362 - Murrumbidgee River at Maude weir Buoy	-34.476	144.306	Recreation, stock, domestic, irrigation
N1059	Murrumbidgee River D/S Wagga Wagga (Roaches Road)	-35.100	147.311	Recreation, stock, domestic, irrigation
N1061	41010901 - Murrumbidgee River at Balranald	-34.644	143.535	Recreation, stock, domestic, irrigation, potable
N1062	41310001 - Murray River at Buronga	-34.175	142.186	Recreation, stock, domestic, irrigation, potable
N1063	41310006 - Murray River at Curlwaa	-34.111	141.982	Recreation, stock, domestic, irrigation, potable
N1064	41310020 - Lake Benanee at rec area	-34.522	142.877	Recreation, stock, domestic, irrigation, potable
N1065	41310021 - Murray River at Mt Dispersion	-34.591	142.472	Recreation, stock, domestic, irrigation, potable

Site ID	Site Name	Latitude	Longitude	Uses
N1066	41310022 - Murray River at Fort Courage	-34.090	141.733	Recreation, stock, domestic, irrigation, potable
N1067	41610161 - Macintyre River at Lake Inverell	-29.792	151.138	Recreation, stock, domestic, irrigation
N1068	42110071 - Macquarie River at U/S Wellington	-32.552	148.973	Recreation, stock, domestic, potable
N1069	42110085 - Macquarie River at Ponto Road Geurie	-32.431	148.811	Recreation, stock, domestic, potable
N1070	42510044 - Darling River at Rose isle	-30.432	145.385	Recreation, stock, domestic, irrigation
N1071	42510046 - Darling River at Trevallyn	-31.365	144.051	Recreation, stock, domestic, irrigation
N1073	42510048 - Darling River at Caulpaulin	-31.732	143.218	Recreation, stock, domestic, irrigation
N1074	42510049 - Darling River at Ellerslie	-33.842	142.014	Recreation, stock, domestic, irrigation
N1075	42510050 - Darling River at Tapio	-33.963	141.957	Recreation, stock, domestic, irrigation
N1076	Darling River at North Bourke Bridge (Boat Ramp)	-30.088	145.936	Recreation, stock, domestic, irrigation
N1077	42610001 - Murray River at Lock 8	-34.129	141.399	Recreation, stock, domestic, irrigation, potable
N1078	42610002 - Lake Victoria at the outlet regulator	-34.048	141.277	Recreation, stock, domestic, irrigation
N1085	425001 - Darling River at Menindee Town	-32.389	142.432	Recreation, stock, domestic, irrigation
N1086	425012 - Darling River at Menindee Weir 32	-32.435	142.380	Recreation, stock, domestic, irrigation
N1086	425012 - Darling River at Menindee Weir 32	-32.435	142.380	Recreation, stock, domestic, irrigation
N1087	42510001 - Menindee Lakes at Lake Wetherell Site 1	-32.111	142.957	Recreation, stock, domestic, irrigation
N1087	42510001 - Menindee Lakes at Lake Wetherell Site 1	-32.111	142.957	Recreation, stock, domestic, irrigation
N1088	42510002 - Menindee Lakes at Lake Wetherell Site 2	-32.172	142.762	Recreation, stock, domestic, irrigation
N1088	42510002 - Menindee Lakes at Lake Wetherell Site 2	-32.172	142.762	Recreation, stock, domestic, irrigation
N1089	Menindee Lake at Lake Wetherell Station 3	-32.258	142.671	Recreation, stock, domestic, irrigation
N1089	Menindee Lake at Lake Wetherell Station 3	-32.258	142.671	Recreation, stock, domestic, irrigation

Site ID	Site Name	Latitude	Longitude	Uses
N1090	42510004 - Menindee Lakes at Lake Wetherell Site 4	-32.304	142.502	Recreation, stock, domestic, irrigation
N1090	42510004 - Menindee Lakes at Lake Wetherell Site 4	-32.304	142.502	Recreation, stock, domestic, irrigation
N1091	42510008 - Menindee Lakes at Tandure Lake Site 8	-32.270	142.542	Recreation, stock, domestic, irrigation
N1091	42510008 - Menindee Lakes at Tandure Lake Site 8	-32.270	142.542	Recreation, stock, domestic, irrigation
N1092	42510009 - Lake Pamamaroo site 9	-32.300	142.503	Recreation, stock, domestic, irrigation
N1092	42510009 - Lake Pamamaroo site 9	-32.300	142.503	Recreation, stock, domestic, irrigation
N1093	MENINDEE LAKES AT LAKE PAMAMAROO SITE 10	-32.308	142.489	Recreation, stock, domestic, irrigation
N1093	MENINDEE LAKES AT LAKE PAMAMAROO SITE 10	-32.308	142.489	Recreation, stock, domestic, irrigation
N1094	42510037 - Menindee Lakes at Copi Hollow	-32.267	142.387	Recreation, stock, domestic, irrigation
N1094	42510037 - Menindee Lakes at Copi Hollow	-32.267	142.387	Recreation, stock, domestic, irrigation
N1095	Darling River Rhwb Pumping Station @ Menindee	-32.389	142.432	Recreation, stock, domestic, irrigation, potable
N1095	Darling River Rhwb Pumping Station @ Menindee	-32.389	142.432	Recreation, stock, domestic, irrigation, potable
N1095a	Darling River d/s Rhwb Pumping Station	-32.397	142.418	Recreation, stock, domestic, irrigation
N1097	Gum Bend Lake	-33.076	147.096	Recreation
N1122	Murrumbidgee River @ Leonard Street, Hay	-34.508	144.849	Recreation, stock, domestic, irrigation
N1128	42510034 - Menindee Lakes - Cawndilla Outlet	-32.523	142.222	Recreation, stock, domestic, irrigation
N1128	42510034 - Menindee Lakes - Cawndilla Outlet	-32.523	142.222	Recreation, stock, domestic, irrigation
N1129	42510013 - Lake Pamamaroo Site 13	-32.275	142.461	Recreation, stock, domestic, irrigation
N1129	42510013 - Lake Pamamaroo Site 13	-32.275	142.461	Recreation, stock, domestic, irrigation

Site ID	Site Name	Latitude	Longitude	Uses
N1130	42510019 - Lake Menindee Site 19	-32.335	142.324	Recreation, stock, domestic, irrigation
N1130	42510019 - Lake Menindee Site 19	-32.335	142.324	Recreation, stock, domestic, irrigation
N1132	42510032 - Lake Cawndilla Site 32	-32.482	142.247	Recreation, stock, domestic, irrigation
N1132	42510032 - Lake Cawndilla Site 32	-32.482	142.247	Recreation, stock, domestic, irrigation
N1168	412002 - Lachlan River at Cowra	-33.834	148.684	Recreation, stock, domestic, irrigation
N1169	421004 - Macquarie River at Warren Weir	-31.734	147.866	Recreation, stock, domestic, irrigation
N1170	421006 - Macquarie River at Narromine	-32.221	148.239	Recreation, stock, domestic, irrigation
N1171	Darling River u/s in Weir 32	-32.350	142.462	Recreation, stock, domestic, irrigation
N1171	Darling River u/s in Weir 32	-32.350	142.462	Recreation, stock, domestic, irrigation
N1171a	Darling River in Weir 32 d/s N1171	-32.356	142.462	Recreation, stock, domestic, irrigation
N1172	410136 - Murrumbidgee River at downstream Hay Weir	-34.526	144.712	Recreation, stock, domestic, irrigation
N1174	210009 - Hunter River at Luskintyre	-36.044	148.037	stock and domestic supply, recreational fishing
N1208	401003 - Tooma River at Warbrook	-36.045	148.038	Public Access
N1209	401201 - Murray River at Jingellic	-35.929	147.704	Public Access
N1210	401556 - Murray River at Indi Bridge	-36.235	148.035	Public Access
N1211	410014 - Colombo Creek at Morundah	-34.937	146.295	Public Access
N1212	410015 - Yanco Creek at Morundah	-34.947	146.268	Public Access
N1213	GOODRADIGBEE RIVER AT WEE JASPER (KASHMIR)	-35.165	148.687	Public Access
N1214	410025 - Jugiong Creek at Jugiong (Inverlockie)	-34.788	148.377	Public Access
N1215	MURRUMBIDGEE RIVER AT DOWNSTREAM YANCO WEIR	-34.696	146.401	Public Access
N1216	410038 - Adjungbilly Creek at Darbalara	-35.018	148.247	Public Access

Site ID	Site Name	Latitude	Longitude	Uses
N1217	MURRUMBIDGEE RIVER AT DOWNSTREAM MAUDE WEIR	-34.478	144.301	Public Access
N1218	410044 - Muttuma Creek at Coolac	-34.931	148.163	Public Access
N1219	410047 - Tarcutta Creek at Old Borambola	-35.162	147.656	Public Access
N1220	410073 - Tumut River at Oddys Bridge	-35.389	148.248	Public Access
N1221	410169 - Yanco Creek at Yanco Bridge	-35.149	145.773	Public Access
N1222	410213 - Murrumbidgee River at Angle Crossing	-35.583	149.109	Public Access
N1223	41010143 - Murrumbidgee River at Waldeira	-34.702	143.322	Public Access
N1224	41010809 - Hillas Creek at Mundarlo Road Bridge	-35.146	147.801	Public Access
N1225	41010890 - Adelong Creek at Bereena	-35.112	148.027	Public Access
N1226	Goobarragandra River Crossing at Little River Road	-35.332	148.340	Public Access
N1227	412009 - Belubula River at Canowindra	-33.571	148.664	Public Access
N1228	412011 - Lachlan River at Lake Cargelligo Weir	-33.201	146.453	Public Access
N1229	412027 - Lachlan River at Reids Flat	-34.129	149.020	Public Access
N1230	412029 - Boorowa River at Prossers Crossing	-34.143	148.812	Public Access
N1231	41210123 - Abercrombie River at Camping Area	-33.954	149.319	Public Access
N1232	416003 - Tenterfield Creek at Clifton	-29.032	151.725	Public Access
N1233	416007 - Dumaresq River at upstream Bonshaw Weir	-28.986	151.276	Public Access
N1234	416008 - Beardy River at Haystack	-29.218	151.383	Public Access
N1235	416010 - Macintyre River at Wallangra	-29.262	150.900	Public Access
N1236	416011 - Dumaresq River at Roseneath	-29.115	151.459	Public Access
N1237	MACINTYRE RIVER AT HOLDFAST (YELARBON CROSSING)	-28.799	150.729	Public Access

Site ID	Site Name	Latitude	Longitude	Uses
N1238	416032 - Mole River at Donaldson	-29.016	151.600	Public Access
N1239	416040 - Dumaresq River at Glenarvon Weir	-28.690	150.893	Public Access
N1240	416048 - Macintyre River at Kanowna	-28.696	149.388	Public Access
N1241	416303 - Pike Creek at Clearview	-28.805	151.523	Public Access
N1242	416309 - Pike Creek at Glenlyon Dam	-28.985	151.468	Public Access
N1243	416310 - Dumaresq River at Farnbro	-28.918	151.585	Public Access
N1244	416312 - Oakey Creek at Texas	-28.789	151.164	Public Access
N1245	416315 - Glenlyon Dam	-28.971	151.462	Public Access
N1246	416415 - Macintyre River at Booba Sands	-28.572	150.846	Public Access
N1247	MACINTYRE RIVER AT SALISBURY BRIDGE (BOGGABILLA)	-28.575	150.349	Public Access
N1248	SEVERN RIVER AT STRATHBOGIE BRIDGE (INVERELL ROAD)	-29.469	151.482	Public Access
N1249	GIL CREEK AT COLLARENEBRI ROAD BRIDGE	-29.148	148.900	Public Access
N1250	416202A - Weir River at Talwood	-28.496	149.491	Public Access
N1251	418002 - Mehi River at Moree	-29.469	149.844	Public Access
N1252	418004 - Gwydir River at Yarraman Bridge	-29.427	149.843	Public Access
N1253	418008 - Gwydir River at Bundarra	-30.166	151.076	Public Access
N1254	418013 - Gwydir River at Gravesend Road Bridge	-29.577	150.357	Public Access
N1255	418014 - Gwydir River at Yarrowyck	-30.467	151.358	Public Access
N1256	418054 - Moomin Creek at Iffley	-29.559	148.891	Public Access
N1257	418058 - Mehi River at Bronte	-29.478	148.903	Public Access
N1258	41810006 - Laura Creek at upstream Bundara	-30.232	151.130	Public Access

Site ID	Site Name	Latitude	Longitude	Uses
N1259	41810033 - Myall Creek at Sheep Station Creek Road	-29.792	150.619	Public Access
N1260	41810058 - Horton River at Elcombe Road Bridge	-29.754	150.396	Public Access
N1261	419001 - Namoi River at Gunnedah	-30.972	150.255	Public Access
N1262	419003 - Narrabri Creek at Narrabri	-30.328	149.781	Public Access
N1263	419006 - Peel River at Carroll Gap	-30.939	150.529	Public Access
N1264	419010 - Macdonald River at Woolbrook	-30.965	151.347	Public Access
N1265	419016 - Cockburn River at Mulla Crossing	-31.061	151.126	Public Access
N1266	419021 - Namoi River at Buglibone (Riverview)	-30.273	148.821	Public Access
N1267	419022 - Namoi River at Manilla Railway Bridge	-30.755	150.717	Public Access
N1268	419024 - Peel River at Upstream Paradise Weir	-31.101	150.939	Public Access
N1269	419026 - Namoi River at Goangra	-30.146	148.390	Public Access
N1270	419027 - Mooki River at Breeza	-31.259	150.471	Public Access
N1271	419032 - Coxs Creek at Boggabri	-30.762	149.985	Public Access
N1272	420004 - Castlereagh River at Mendooran	-31.821	149.116	Public Access
N1273	421011 - Marthaguy Creek at Carinda	-30.457	147.684	Public Access
N1274	421012 - Macquarie River at Carinda (Bells Bridge)	-30.435	147.570	Public Access
N1275	421018 - Bell River at Neurea	-32.678	148.948	Public Access
N1276	421019 - Cudgegong River at Yamble Bridge	-32.408	149.334	Public Access
N1277	421025 - Macquarie River at Bruinbin	-33.133	149.429	Public Access
N1278	421038 - Cudgegong River at Rylstone Bridge	-32.793	149.971	Public Access
N1279	421042 - Talbragar River at Elong	-32.091	149.067	Public Access
N1280	MACQUARIE RIVER AT U/S SPILLWAY BURRENDONG DAM	-32.664	149.107	Public Access

Site ID	Site Name	Latitude	Longitude	Uses
N1281	421176 - Little River at Arthurville No.2	-32.572	148.725	Public Access
N1282	42110101 - Macquarie River at Molong Rail Bridge	-32.283	148.604	Public Access
N1283	42110170 - Turon River at Bathurst Point	-33.076	149.671	Public Access
N1284	42110171 - Fish River at Hazelgrove	-33.565	149.898	Public Access
N1285	422012 - Narran River at New Angledool	-29.114	147.905	Public Access
N1286	422013 - Birrie River at Near Goodooga	-29.102	147.428	Public Access
N1287	422014 - Bokhara River at Goodooga	-29.113	147.448	Public Access
N1288	422015 - Culgoa River at Brenda	-29.029	147.314	Public Access
N1289	423002 - Warrego River at Fords Bridge Bywash	-29.756	145.443	Public Access
N1290	424002 - Paroo River at Willara Crossing	-29.242	144.456	Public Access
N1292	Murray River at River Murray Pump Station	-34.113	141.923	Recreation, stock, domestic, irrigation, potable
N1292	Murray River at River Murray Pump Station	-34.113	141.923	Recreation, stock, domestic, irrigation, potable
N1298	Darling River at Ashvale 425056	-33.809	142.115	Stock, domestic
N1299	Darling River at Jamesville 425057	-33.728	142.295	Stock, domestic
N1300	Karoola Station Darling River	-33.029	142.360	Stock, domestic
N1301	Court Nareen Station Darling River	-33.216	142.385	Stock, domestic
N1303	CUDGEGONG RIVER AT ROCKY WATER HOLE	-32.620	149.642	Recreation, stock, domestic, irrigation
N1304	Cudgegong River at Wilbertree Rd	-32.509	149.570	Recreation, stock, domestic, irrigation
N1306	Macintyre River at Malgarai	-28.651	150.415	Stock, domestic, recreation
N1310	Bottom Weir at Warren (Brian Egan Weir Pool)	-31.685	147.835	Recreation, Town Water Supply
N1311	Mehi River at Gundare	-29.589	149.316	Irrigation, stock and domestic, recreation
N1312	Macintyre River at Goondiwindi Boat Ramp	-28.547	150.299	Public Access
N1313	Murrumbidgee Downstream of Bredbo confluence	35.956	149.129	Recreation, stock and domestic

Site ID	Site Name	Latitude	Longitude	Uses
N1315	Yarrawonga Weir at Hogan Road Boat Ramp	-36.004	146.049	Recreational
N1316	Yarrawonga Weir @ Outlet/Wall	-36.006	145.999	Recreational
N1317	Manilla River at Barraba	-30.385	150.613	recreation, stock and domestic

Water Quality Discrete Sampling Potential Upgrades

A few adjustments were identified for water quality sampling locations.

Table 14 - WQ Discrete Sampling Potential Upgrades

Site ID	Site Name	Latitude	Longitude	Comments
DLH001	Lake Hume at Heywoods	-36.071	147.064	Not ideally located and needs to be adjusted to reflect conditions in the Murray Arm of Lake Hume
DLH002	Hume Dam Lake Hume Resort	-36.102	147.041	Not ideally located and needs to be adjusted to reflect conditions in the Murray Arm of Lake Hume
New Site Requested	Sunraysia	-32.418	142.377	Downstream from N1095a and Upstream from N1080 - this site has had significant algal biomass in the past

Water Quality Discrete Sampling Potential Downgrades

It is possible to rationalise a few of the existing water quality monitoring locations by ceasing monitoring, especially where a nearby site is also monitored. However, as the main cost is travel to and from the sampling location, there is less value in ceasing monitoring adjacent sites, or reducing the parameters monitored at a site.

Table 15 - WQ Discrete Sampling Potential Downgrades

Site ID	Site Name	Latitude	Longitude	Comments
N1315	Yarrawonga Weir at Hogan Road Boat Ramp	-36.003	146.049	Goulburn Murry Water (GMW)- possibly ceased sampling
N1316	Yarrawonga Weir @ Outlet/Wall	-36.006	145.998	Duplication of station N1007 and GMW monitor the outlet - possibly ceased sampling
N1088	42510002 - Menindee Lakes at Lake Wetherell Site 2	-32.171	142.762	Need to rationalise monitoring stations within Wetherell Algal / Menindee Lakes WQ
N1089	Menindee Lake at Lake Wetherell Station 3	-32.258	142.670	Could be omitted and downstream station on the Darling R reinstated. Algal / Menindee Lakes WQ

Site ID	Site Name	Latitude	Longitude	Comments
N1095a	Darling River D/ Rhwb Pumping Station	-32.396	142.418	Duplication of station N1095 – possibly already ceased sampling?
N1092	42510009 - Lake Pamamaroo site 9	-32.299	142.502	Uncertain if both stations are necessary for Algal / Menindee Lakes WQ
N1093	Menindee Lakes at Lake Pamamaroo Site 10	-32.308	142.489	Algal / Menindee Lakes WQ – uncertain if N1092 and N1093 are necessary
N1171a	Darling River in Weir 32 d/s N1171	-32.356	142.462	Maintain station N1171 instead

Water Quality Monitoring Background

Water Quality Monitoring Programs

Historically water quality monitoring was recognised as important and so from the late 1960s water temperature was routinely recorded while other parameters were sampled in the field or sent to the laboratory for analysis. By the late 1970s Electrical Conductivity (EC), pH and Turbidity results were being observed, recorded, and reported at stream gauging stations. It was not until digital technology had advanced significantly that on-line, wetted sensors were used to sample and record in real time, parameters including water temperature, EC, pH, Turbidity and Dissolved Oxygen.

The data from the algal sites are used to inform incident management and public health notices. The data from the SWAMP, MDBA and DBBRC programs is used to develop risk assessments to inform water sharing plan rules, assess the effectiveness of WSP rules and for Basin Plan (Schedule 12) reporting. This data may also inform responses to ecological threats as required under the incident response guides.

The monitoring program includes physical, chemical, and biological parameters through on-line, field sampling and laboratory analysis. It specifies the frequency at which analytes are collected and tested at nominated sites and aligned with catchment to customer risk assessment. On-line and continuous time series monitoring is conducted at selected sites with essential processes found as critical control points. Other sites are monitored at sufficient frequency to reveal any challenges or threats so that corrective actions can be taken.

Monitoring has been designed to identify water quality risks, verify the effectiveness of preventive measures and barriers, supply early warning to inform and verify operational decisions and to show compliance.

Events, such as seasonal natural occurrences or configurational changes, can change the risks at given periods. Event monitoring is incorporated into the routine program to gain an immediate understanding of issues likely to affect the water supply system. Examples of known water quality events include lake turnover, bushfires, large inflows, or algal blooms. Each event is likely to be unique and monitoring requirements are decided based on experience, known prevailing conditions and the assessed risk to the water supply and to public health.

Field sampling

WaterNSW requires sampling staff to follow collection and handling procedures which comply with requirements of analytical lab methodologies. These procedures cover holding times, preservation, and transport requirements to allow labs to undertake analysis using accredited methods. They

provide audit trails of sample handling and aid in investigating irregular results. The Samplers are regularly audited for proficiency to ensure standards are maintained.

Data coding

According to the Water Monitoring Program 2019 all online hydrometric time series data including on-line water quality is divided into two categories, good (category A) and unusable (category B). The data is coded using these descriptors to show the quality. WaterNSW aims to achieve >90% category A data from all high priority sites. WaterNSW maintains a raw and coded HYDSTRA database.

Laboratory analysis

WaterNSW requires samples to be analysed using methods and equipment descriptions that are detailed in the American Public Health Association (APHA) Standard Methods for the Examination of Water and Wastewater, 22nd edition 2012 or later version, and preferably accredited by NATA.

All laboratories used by WaterNSW have an internal laboratory QA/QC program, based on added analyses of randomly selected batches of samples, with known spikes and blanks. This data is internally validated by the laboratories and checked by independent experts for accuracy and/or precision, errors, contamination, and outliers.

Field and Laboratory QA/QC

WaterNSW reviews and analyses QA/QC samples to verify sampling methodologies, precision of laboratory analysis, and sources of systemic sample contamination. Field QA/QC samples consist of duplicates, field blanks and trip blanks. In addition, all field instruments must be calibrated following the manufacturer's instructions with reference to international standards.

Water Quality Data Uses

WaterNSW Monitoring program design is guided by the following management considerations:

1. Are customers confident that WaterNSW is supplying water of appropriate quality?
2. Are relevant water quality and quantity goals and standards being met?
3. Where, how, and why is water quality changing over time?
4. Where how and why are our catchments changing over time?
5. What are the impacts of WaterNSW's dams and weirs on river conditions?
6. What are the hazards and associated risks to water quality in WaterNSW storages?
7. Are WaterNSW's actions to prevent or remedy problems working effectively?
8. Is WaterNSW able to access sufficient information in time to respond to incidents in the catchments or water supply system?
9. Do we have sufficient/accurate information to develop and validate our models?

Algal monitoring in rural storages

Most of WaterNSW water bodies in rural NSW are used for recreation. Levels of algae are monitored as per the Regional Algal Contingency Plans (RACP) and to provide advice about risks in recreational waters and requirements for advisory signage.

Total algal counts, total algal biovolume, and total cyanobacterial counts and biovolume are measured.

Monitoring objectives

- To assess algal levels to inform need for issuing alerts
- To provide information on environmental and recreational water quality
- Assess river condition and show water quality trends through the assessment of physical and chemical water properties
- To minimise risks to public health
- To ensure exposure risk is managed effectively

Monitoring of rural rivers

Monitoring is undertaken in rural rivers to characterise water quality and quantity. Physical and chemical properties are analysed monthly as part of the Surface Water Assessment and Monitoring Program (SWAMP). Algal analysis is conducted monthly as part of the Regional Algal Coordinating Committee program (RACP).

Objectives

The Surface Water (Quality) Assessment and Monitoring Program (SWAMP) aims to:

- Maintain and manage a monitoring program to assist in meeting the requirements of the *Water Management Act 2000*,
- Demonstrate NSW's commitment to Basin Plan implementation and reporting,
- Inform Water Sharing Plan objectives.

Water quality monitoring sites in rural rivers (SWAMP program)

Analytes are sampled monthly for field determination of pH, temperature, conductivity, dissolved oxygen (mg/L, % saturation), turbidity.

Monthly laboratory determinations are for Nitrogen oxidised (coastal sites only), total nitrogen, phosphorus soluble reactive (coastal sites only), total phosphorus, suspended solids, sodium filtered, calcium filtered, potassium filtered, magnesium filtered, sulphate, chloride, bicarbonate alkalinity, carbonate alkalinity, hydroxide alkalinity, alkalinity, total hardness, sodium absorption rate (SAR).

Algal monitoring sites in rural rivers

Analytes are sampled monthly (or select sites fortnightly based on risk) and laboratory determinations for total algal counts, total algal biovolume, total cyanobacterial counts, total algal ASU

Monitoring downstream of rural storages for cold water pollution

WaterNSW operates a complex system of major storages. Water temperatures are monitored at selected rivers with established monitoring sites in rural rivers downstream of the storages. Dam outlets are configured to ensure as far as practicable that the temperature of releases from storages closely mimics the expected natural water temperature downstream.

Meteorological Review Summary

This review of meteorological monitoring sites in the Murray Darling Basin was conducted using information derived from SME in WaterNSW, DPIE, BoM and MDBA. Added rainfall needs were also named during the surface water Gauging Station review process with Water NSW River Operations rating rainfall at several river gauging stations as important.

There were 110 meteorological sites (mostly rainfall) named and included in the SME review. Of these, ninety-six (96) sites are telemetered via the cellular telephone network and data made available on the Water NSW Hydstra corporate database. Eighty-three (83) of these record rainfall together with water level and flow data at river gauging stations; two (2) are connected to hydrometric storage gauges and record rainfall together with evaporation data; seven (7) are autonomous rain gauges and four (4) record rainfall together with AWS data at Agricultural Research sites.

Of the 110 meteorological sites, fourteen (14) are telemetered and stored via Water NSW SCADA systems and are not currently available on the Hydstra database. Of these there are twelve (12) AWS sites located at water storages with rain and weather data telemetered via SCADA; one (1) site is located at a water storage recording rainfall together with evaporation and air temperature data and (1) rain gauge is located at a SCADA telemetered stream gauging station. The data quality and capture rates of the SCADA operated sites is not known.

Two (2) sites 412002 and 412006 on Hydstra store rainfall data which is imported from BoM rainfall sites and no rain gauges exist at these sites. These were ranked as important by SME but have not been included in any site upgrade requests.

Meteorological Current Sites List

Table 16 - Meteorological Current Sites List

Valley	Site Number	Site Name	Comment
410 Murrumbidgee	41000261	41000261 Goobarragandra River @ Macs Crossing	Rainfall in conjunction with stream gauging site
410 Murrumbidgee	41000269	41000269 Brungle Creek @ Red Hill No.2	Rainfall in conjunction with stream gauging site
410 Murrumbidgee	41000272	41000272 Murrumbidgee River Upstream Michelago Creek	Rainfall in conjunction with stream gauging site
410 Murrumbidgee	41000275	41000275 Dpi-Wagga Auto Weather Station	DPI Ag research site AWS
410 Murrumbidgee	41000279	41000279 Brookong Creek @ Hollies Road	Rainfall in conjunction with stream gauging site
410 Murrumbidgee	41000280	41000280 Burkes Creek @ Mangoplah	Rainfall in conjunction with stream gauging site
410 Murrumbidgee	410060	410060 Nimming Pollen Creek @ Offtake	SCADA only Rain
410 Murrumbidgee	410114	410114 Killimcat Creek @ Wyangle	Rainfall in conjunction with stream gauging site
410 Murrumbidgee	410160	410160 Williams Creek @ Whitehill	Rainfall in conjunction with stream gauging site
410 Murrumbidgee	572028	572028 Upper Goob Rainfall	Rainfall only

Valley	Site Number	Site Name	Comment
410 Murrumbidgee	572031	572031 Peppercorn Rainfall	Rainfall only
416 Macintyre	416081	416081 Barwon River @ Eagle Farm	Rainfall in conjunction with stream gauging site
410 Murrumbidgee	41000271	41000271 Alum Creek @ Jones Plain Road	Rainfall in conjunction with stream gauging site
410 Murrumbidgee	410025	410025 Jugiong Creek @ Jugiong (Inverlockie)	Rainfall in conjunction with stream gauging site
410 Murrumbidgee	410057	410057 Goobarragandra River @ Lacmalac	Rainfall in conjunction with stream gauging site
410 Murrumbidgee	410102	410102 Tumut River @ Blowering Dam - Storage Gauge	SCADA AWS + Evaporation Storage Gauge
410 Murrumbidgee	410112	410112 Jindalee Creek @ Jindalee	Rainfall in conjunction with stream gauging site
410 Murrumbidgee	410131	410131 Murrumbidgee River @ Burrinjuck Dam - Storage Gauge	SCADA - AWS + Evaporation Storage Gauge
410 Murrumbidgee	410155	410155 Tarcutta Creek @ Belmore Bridge	Rainfall in conjunction with stream gauging site
410 Murrumbidgee	410156	410156 Kyeamba Creek @ Book	Rainfall in conjunction with stream gauging site
410 Murrumbidgee	573015	573015 Mundarlo Rainfall	Rainfall only
410 Murrumbidgee	573016	573016 Adjungbilly Rainfall	Rainfall only
412 Lachlan	412002	412002 Lachlan River @ Cowra*	No WaterNSW Met data collected - data from BoM
416 Macintyre	416008	416008 Beardy River @ Haystack	Rainfall in conjunction with stream gauging site
416 Macintyre	416016	416016 Macintyre River @ Inverell (Middle Creek)	Rainfall in conjunction with stream gauging site
416 Macintyre	416020	416020 Ottleys Creek @ Coolatai	Rainfall in conjunction with stream gauging site
416 Macintyre	416021	416021 Frazers Creek @ Westholme (Ashford)	Rainfall in conjunction with stream gauging site
416 Macintyre	416023	416023 Deepwater River @ Bolivia	Rainfall in conjunction with stream gauging site
416 Macintyre	416030	416030 Severn River @ Pindari Dam-Storage Gauge	SCADA Evaporation +Air temp Storage Gauge
416 Macintyre	416031	416031 Macintyre River @ Ridgeland	Rainfall in conjunction with stream gauging site
416 Macintyre	416032	416032 Mole River @ Donaldson	Rainfall in conjunction with stream gauging site
416 Macintyre	416040	416040 Dumaresq River @ Glenarbon Weir	Rainfall in conjunction with stream gauging site

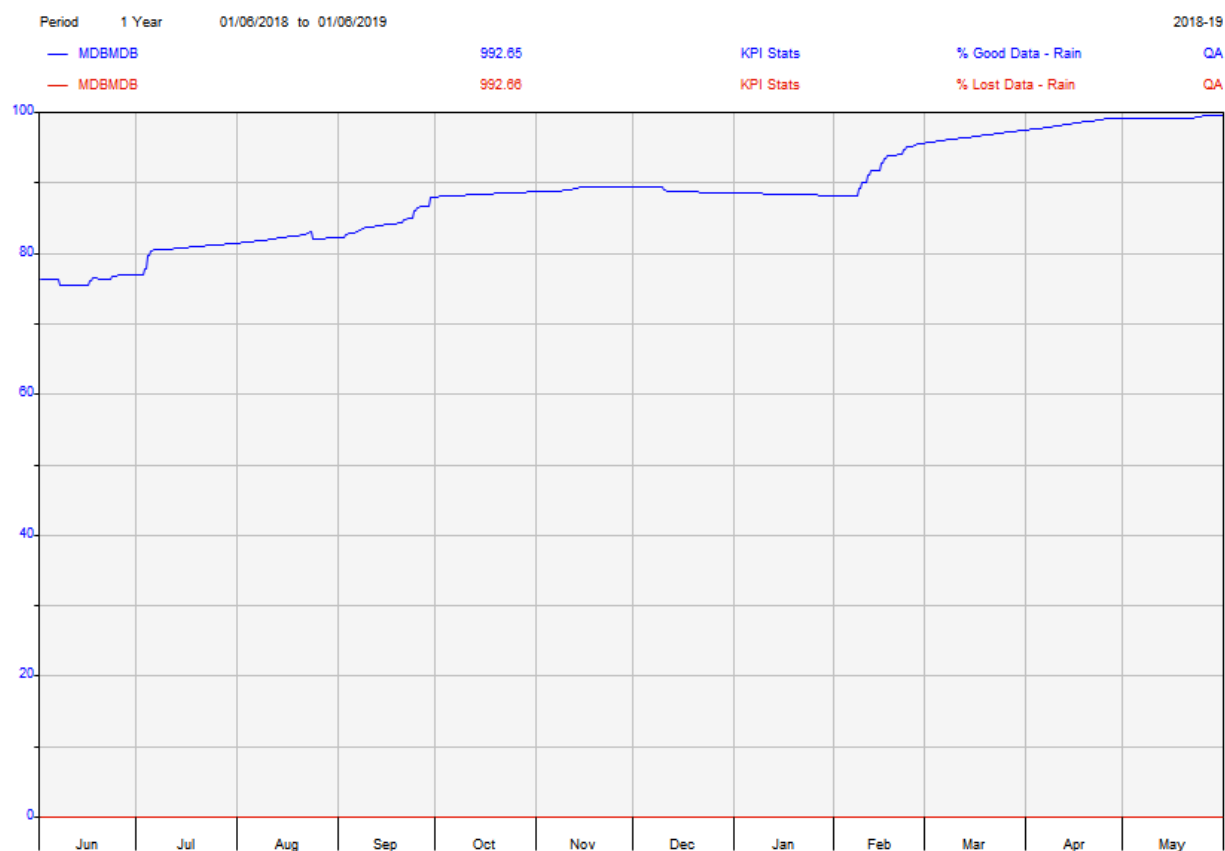
Valley		Site Number	Site Name	Comment
416	Macintyre	416055	416055 Middle Creek @ Ferndale	Rainfall in conjunction with stream gauging site
416	Macintyre	416056	416056 Macintyre @ Little Valley	Rainfall in conjunction with stream gauging site
416	Macintyre	416057	416057 Macintyre River @ Elsmore Bridge	Rainfall in conjunction with stream gauging site
416	Macintyre	416058	416058 Macintyre River @ Yetman Bridge	Rainfall in conjunction with stream gauging site
416	Macintyre	416059	416059 Kings Creek @ Gred	Rainfall in conjunction with stream gauging site
416	Macintyre	416061	416061 Paradise Creek @ Paradise Station	Rainfall in conjunction with stream gauging site
416	Macintyre	416062	416062 Kings Creek @ Newstead North	Rainfall in conjunction with stream gauging site
416	Macintyre	416063	416063 Macintyre River @ Wyoming	Rainfall in conjunction with stream gauging site
416	Macintyre	416064	416064 Middle Creek @ Stannifer	Rainfall in conjunction with stream gauging site
416	Macintyre	416066	416066 Macintyre River @ Riverstone	Rainfall in conjunction with stream gauging site
416	Macintyre	416068	416068 Macintyre River @ Tintot	Rainfall in conjunction with stream gauging site
416	Macintyre	416069	416069 Frazers Creek @ Glenorchy	Rainfall in conjunction with stream gauging site
419	Namoi	419010	419010 Macdonald River @ Woolbrook	Rainfall in conjunction with stream gauging site
419	Namoi	419028	419028 Macdonald River @ Retreat	Rainfall in conjunction with stream gauging site
419	Namoi	419033	419033 Coxs Creek @ Tambar Springs	Rainfall in conjunction with stream gauging site
419	Namoi	419041	419041 Namoi River @ Keepit Dam - Storage Gauge	SCADA AWS Storage Gauge
419	Namoi	419069	419069 Peel River @ Chaffey Dam - Storage Gauge	SCADA AWS Storage Gauge
419	Namoi	419076	419076 Warrah Creek @ Old Warrah	Rainfall in conjunction with stream gauging site
419	Namoi	419080	419080 Manilla River @ Split Rock Dam Storage Gauge	SCADA AWS Storage Gauge
419	Namoi	419084	419084 Mooki River @ Ruvigne	Rainfall in conjunction with stream gauging site AWS
419	Namoi	419085	419085 Bomera Creek @ Tambar-Premier Road	Rainfall in conjunction with stream gauging site
419	Namoi	419086	419086 Bundella Creek @ Bundella	Rainfall in conjunction with stream gauging site

Valley	Site Number	Site Name	Comment
420 Castlereagh	420003	420003 Belar Creek @ Warkton	Rainfall in conjunction with stream gauging site
421 Macquarie	421078	421078 Macquarie River @ Burrendong Dam - Storage Gauge	SCADA AWS Storage Gauge
421 Macquarie	421148	421148 Cudgegong River @ Windamere Dam-Storage Gauge	SCADA AWS Storage gauge
421 Macquarie	421178	421178 Molong Creek @ Downstream Borenore Creek	Rainfall in conjunction with stream gauging site
409 Murray	409113	409113 Barbers Creek @ Barbers Pool	Rainfall in conjunction with stream gauging site
418 Gwydir	418005	418005 Copes Creek @ Kimberley	Rainfall in conjunction with stream gauging site
418 Gwydir	418035	418035 Gwydir River @ Copeton Dam-Storage Gauge	SCADA AWS + Evaporation at storage
418 Gwydir	418070	418070 Moomin Creek @ Moomin Plains	Rainfall in conjunction with stream gauging site
412 Lachlan	412004	412004 Lachlan River @ Forbes (Cottons Weir)	Rainfall in conjunction with stream gauging site
412 Lachlan	412039	412039 Lachlan River @ Hillston Weir	Rainfall in conjunction with stream gauging site
412 Lachlan	412006	412006 Lachlan River @ Condobolin Bridge	<i>No WaterNSW Rain data collected - data from BoM</i>
412 Lachlan	412134	412134 Wattle Creek @ Dudauman	Rainfall in conjunction with stream gauging site
418 Gwydir	418008	418008 Gwydir River @ Bundarra	Rainfall in conjunction with stream gauging site
418 Gwydir	418014	418014 Gwydir River @ Yarrowyck	Rainfall in conjunction with stream gauging site
418 Gwydir	418027	418027 Horton River @ Horton Dam Site	Rainfall in conjunction with stream gauging site
419 Namoi	419032	419032 Coss Creek @ Boggabri	Rainfall in conjunction with stream gauging site
419 Namoi	419034	419034 Mooki River @ Caroon	Rainfall in conjunction with stream gauging site
419 Namoi	419035	419035 Goonoo Goonoo Creek @ Timbumburi	Rainfall in conjunction with stream gauging site
421 Macquarie	421146	421146 Gum Cowal @ Bifurcation	Rainfall in conjunction with stream gauging site
401 Upper Murray	401012	401012 Murray River @ Biggara	Rainfall in conjunction with stream gauging site
412 Lachlan	41200209	41200209 Abercrombie River @ Abercrombie No.2	Rainfall in conjunction with stream gauging site

Valley		Site Number	Site Name	Comment
412	Lachlan	412029	412029 Boorowa River @ Prossers Crossing	Rainfall in conjunction with stream gauging site
412	Lachlan	412065	412065 Lachlan River @ Narrawa	Rainfall in conjunction with stream gauging site
412	Lachlan	412139	412139 Mandagery Creek @ Glenayr	Rainfall in conjunction with stream gauging site
418	Gwydir	418013	418013 Gwydir River @ Gravesend Road Bridge	Rainfall in conjunction with stream gauging site
419	Namoi	419081	419081 Peel River @ Taroon	Rainfall in conjunction with stream gauging site
401	Upper Murray	401007	401007 Tumbarumba Creek @ Tumbarumba No.2	Rainfall in conjunction with stream gauging site
401	Upper Murray	401008	401008 Mannus Creek @ Tooma	Rainfall in conjunction with stream gauging site
401	Upper Murray	401009	401009 Maragle Creek @ Maragle	Rainfall in conjunction with stream gauging site
401	Upper Murray	401013	401013 Jingellic Creek @ Jingellic	Rainfall in conjunction with stream gauging site
401	Upper Murray	401014	401014 Tooma River At Pinegrove	Rainfall in conjunction with stream gauging site
401	Upper Murray	401015	401015 Bowna Creek @ Yambula	Rainfall in conjunction with stream gauging site
401	Upper Murray	401016	401016 Welumba Creek @ The Square	Rainfall in conjunction with stream gauging site
401	Upper Murray	401026	401026 Maragle Back Creek @ Gloaming	Rainfall in conjunction with stream gauging site
401	Upper Murray	401027	401027 Murray River @ Hume Dam - Storage Gauge No.2	Rainfall in conjunction with storage gauging site + Evaporation
401	Upper Murray	401029	401029 Mannus Creek @ Glenroy No.2	Rainfall in conjunction with stream gauging site

Meteorological - Rainfall Performance Review

Figure 24 - Percentages of good quality and lost Rainfall data - MDB Sites



The percentage of good quality rainfall data is on average at an 90% data capture rate with an improving trend to 100% good data capture and no losses in the review period

Meteorological Sites Potential Upgrades - Rainfall

Table 17 Meteorological Sites Potential Rainfall Upgrades

Site ID	Site Name/Location
412027	Lachlan River at Reids Flat
412050	Crookwell river at Narrawa North
412056	Belubula River at the Needles
412066	Abercrombie River at Hadley no.2
421019	Cudgegong River at Yamble Bridge
421026	Turon River at Sofala
421191	Macquarie River at Yarracoona
421904	Talbragar River at Dunedoo
409014	Edward River at Moulamein
409037	Murray River at Howlong
409002	Murray River at Corowa

Site ID	Site Name/Location
425012	Darling River at Menindee U/S Weir 32
425048	Darling River at Great Darling Anabranh Offtake
425007	Darling River at Burtundy
410130	Murrumbidgee River at D/S Balranald Weir
New Site (including new Water Level)	Tailgauge on the Murray arm of Hume around Mt Porcupine
New Site	Jergyle Mt Woomagarma National Park
New Site	Oak Hill -Bogandyera Nature Reserve
New Site	Mt Welaregang
New Site	Tin Mine Falls
New Site	Dogmas Hut Camping area

Upgrades requests for high priority new rain gauges are at 15 existing hydrometric river gauging stations; with 6 new rainfall monitoring sites.

Meteorological Sites Potential Downgrades

Table 18 Meteorological Sites - Potential Downgrades

Valley	Site Number	Site	Comment
410 Murrumbidgee	41000275	41000275 Dpi-Wagga Auto Weather Station	DPI Ag site AWS
410 Murrumbidgee	410060	410060 Nimming Pollen Creek @ Offtake	SCADA
410 Murrumbidgee	410160	410160 Williams Creek @Whitehill	Rainfall in conjunction with stream gauging site
412 Lachlan	412010	412010 Wyangala Dam @ Storage Gauge	SCADA AWS
412 Lachlan	412107	412107 Lake Cargelligo @ Storage Gauge	SCADA AWS
416 Macintyre	416081	416081 Barwon River @ Eagle Farm	Rainfall in conjunction with stream gauging site
419 Namoi	419113	419113 Dpi-Tamworth Auto Weather Station	DPI Ag site AWS
421 Macquarie	421189	421189 Fish River @ Oberon Dam - Storage Gauge	SCADA AWS
421 Macquarie	421198	421198 Dpi-Orange Auto Weather Station	DPI Ag site AWS
422 Culgoa	422016	422016 Narran River @ Wilby (Belvedere)	Rainfall in conjunction with stream gauging site
425 Darling	425022	425022 Darling River @ Lake Menindee - Storage Gauge	Rainfall in conjunction with stream gauging site + Evaporation

Public Interest Meteorological Sites

It is not possible to assess the public interest in rainfall data as most of the sites are associated with existing online and telemetered river water level, flow, or water quality data.

Meteorological Background

Rainfall data has been recorded at monitoring sites in the Murray Darling Basin from the beginning of gauging station records in the mid to late 1800s. Rainfall, cloud cover and other meteorological events were recorded by citizen Gauge Readers to complement their river flow observations. These readings were based on volumetric rain gauges where the total was recorded daily at 9am. The rainfall units until metrification in the 1970s were inches and points (100 points to an inch).

Figure 25 - Gauge Readers book – Edwards River at Deniliquin May 1894 showing rainfall, wind, and cloud cover

NEW SOUTH WALES.
DEPARTMENT OF WORKS.
RECORDS CONCERNING
RIVER CONSERVANCY.

REGISTER of Gauge at *Deniliquin* River *Edwards*
of *May* 1894 for the Month

Day	Hour	Baromet.	Wind	Clouds	Remarks
1	9.4m	13.3	Clear	S	Fine
2		13.6	Clear	SW.	Fine
3		13.9	Clear	SW.	Fine
4		13.9	Clear	SW.	Fine & cloudy
5		13.5	Clear	SW.	Fine
6		13.3	Clear	SW.	Fine
7		13.1	Clear	SW.	Fine
8		12.11	Clear	SW.	Fine
9		12.9	Calms & foggy	SW.	Fine
10		12.7	Calms & foggy	SW.	Fine
11		12.5	Calms	SW.	Fine
12		12.2	Clear	W.	Fine
13		12.	Clear & foggy	W.	Fine
14		11.11	Calms	W.	Fine
15		11.9	Cloudy	S.	Fine
16		11.7	Calms & cloudy	N.W.	Rain 13 pts
17		11.5	Calms & dull	W.N.W.	Fine
18		11.3	Calms & dull	N.W.	Rain 3 pts
19		11.1	Calms & dull	SW.	Rain 26 pts
20		11.	Clear	SW.	Fine
21		11.	Variable	SW.	Rain 5 pts
22		11.	Variable	SW.	Dull
23		11.	Foggy	WSW.	Fine
24		11.	Dull	W	Rain 7 pts
25		11.	Clear	W	Clear & fine
26		11.3	Calms & cloudy	W	Fine
27		11.8	Calms	W	Fine
28		11.10	Calms & cloudy	W	Fine
29		12.	Calms & cloudy	W.N.W.	Fine
30		12.2	Calms & cloudy	N.W.	Rain 6 pts
31		12.4	Dull & cloudy	N	Rain 5 1/4 pts
31		12.6			

D. C. Strachan Observer.

The names of "Records" are all entered in full on the following table:-
(1) Time and extent of changes in level of water in gauge and up.
(2) Accumulation of water over place of gauge.
(3) Approximate quantity and time of any heavy fall of rain.
(4) Nature and approximate quantity of crops carried by wind.
H. G. MAXINNEY.
Clerk of the Survey.

During the mid-1900s analogue standalone rainfall recorders were developed to record the volume and intensity of rainfall events. These rainfall recorders were installed at locations to meet a specific need such as in planning for dams and special projects in smaller catchments.

Figure 26 - Example of a standalone Rain Gauge (Mort Pluviograph) recording onto a paper chart. July 1940

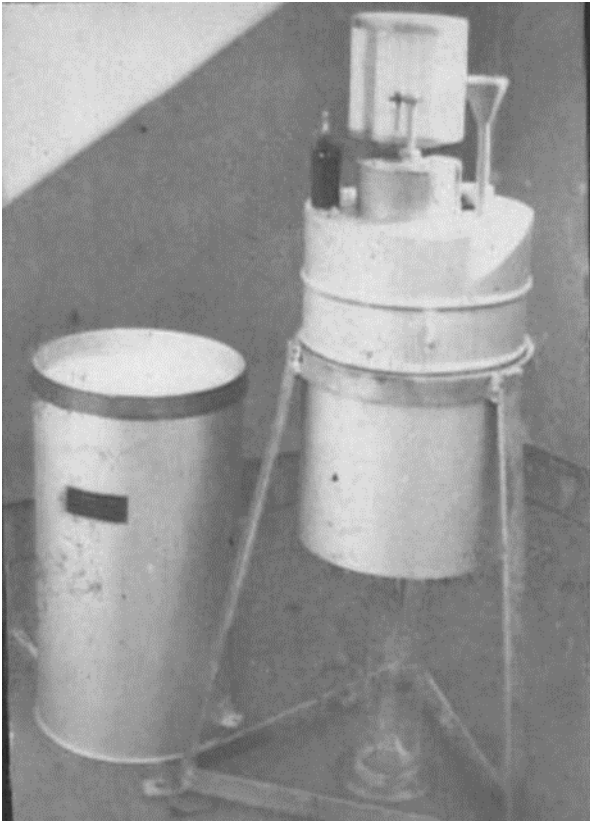
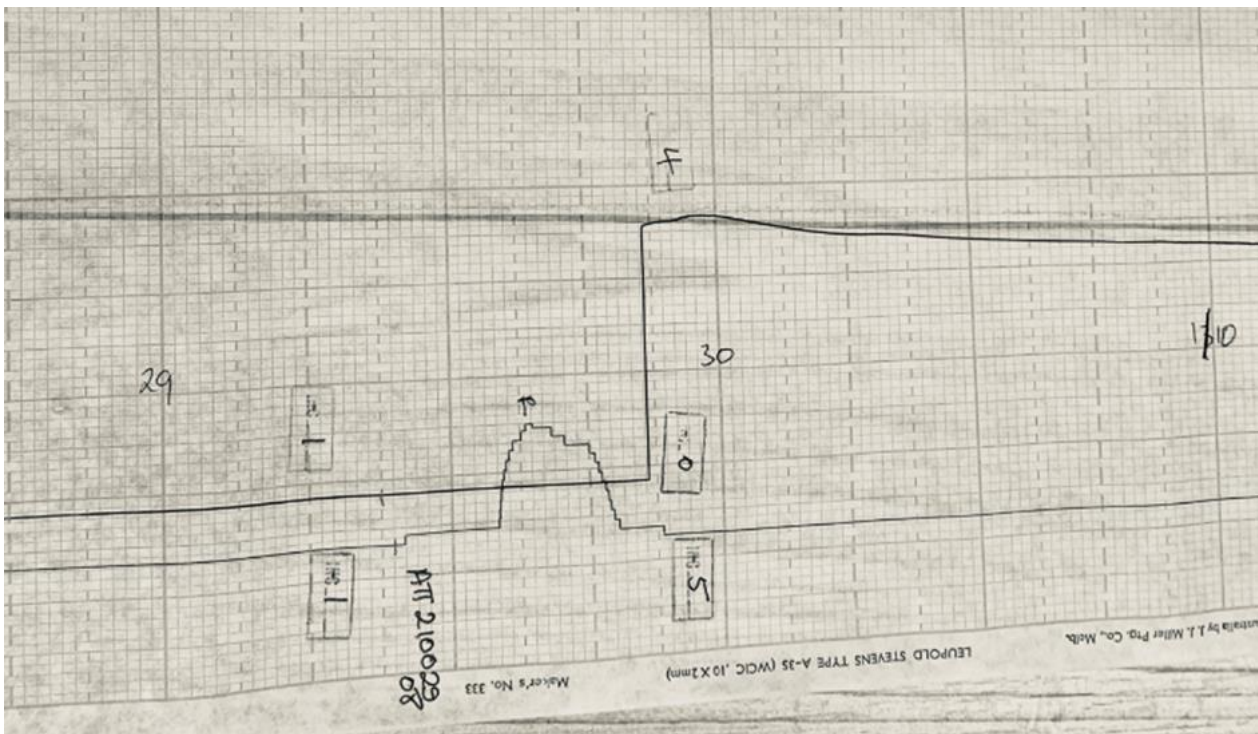


Figure 27 - Example of a Tipping Bucket Rain Gauge recording onto a paper chart. August 1977



It was not until the digital age in the 1990's that solid state data loggers were more widely used across the network. While Tipping Bucket Rain Gauges (TBRG) had been in use on analogue

recorders since the mid-1970s, dataloggers and more importantly telemetry gave access to ‘real time’ rainfall data. The primary use of this information was for the Bureau of Meteorology in their role as flood prediction and forecasting. At the same time river operators began using this information as input to operating dams and rivers. 83 of the currently active rain gauges are recorded along with water level and flow at hydrometric monitoring sites.

Figure 28 - Numbers of rain gauges since 1975.

Active MDB Rainfall Sites at	
1/01/1975	0
1/01/1980	4
1/01/1985	4
1/01/1990	7
1/01/1995	30
1/01/2000	51
1/01/2005	63
1/01/2010	69
1/01/2015	85
1/01/2020	88
Sites Opened	132
Sites Open 01/01/2020	88
Site Closed	44

Meteorological Data Uses

Hydrometric monitoring sites measure rainfall and other weather station related parameters at some locations. Together with streamflow gauges and water storage gauges, meteorological data (mainly rainfall) are collected by WaterNSW and are used to predict major water storage and catchment inflow events, flooding, water balances and associated water quality conditions.

Currently the BOM, WaterNSW and MDBA are major stakeholders for rainfall information in an operational context. Rainfall data is made available to modellers and are available on the internet.

Further information

For more information about water monitoring in New South Wales visit:

- [Science, data, modelling and maps - Water in New South Wales \(industry.nsw.gov.au/water\)](https://industry.nsw.gov.au/water)
- [Water Monitoring Networks](https://www.water.nsw.gov.au/) (WaterNSW.com.au)
- [Contact Us](#).

Data Inventory

Figure 30 - Upper Murray Basin (401) - Source WaterNSW website

SURFACE_WATER Archive Data Inventory for 401-Upper Murray River Basin
S=Telemetered
**Storage

Station ID	FLOWS		HEIGHTS		RATINGS		No. of		RAWCT		WHO		Discont.		Org. Net		NAME	
	Start	End	Start	End	First Starts	Last Starts	Last Tab	No. of	No. of	at m n r p n m y	at m n r p n m y	at m n r p n m y	Date		Code	Class		
\$401007	01/01/1946	01/01/2017	30/07/1977	22/05/2019	04/05/1973	07/09/2018	72	21	402	R	T	C			DWR	SMS	TUMBARUMBA @ TUMBA2	
\$401008	01/01/1947	01/01/2017	24/08/1971	27/06/2019	01/12/1947	03/12/2017	122	39	385	R	T	C			DWR	SPS	MANNUS @ TOOMA	
\$401009	01/01/1947	01/01/2017	01/12/1947	27/06/2019	01/12/1947	16/08/2017	395	15	461	R	T	C			DWR	PI	MARAGLE @ MARAGLE	
\$401012	01/01/1948	01/01/2017	29/02/1968	03/07/2019	21/07/1948	04/10/2016	215	36	543	R	T	C			DWR	FPS	MURRAY @ BIGGARA	
\$401012B					21/07/1948	04/10/2016	215	36	490						DWR	FPS	MURRAY @ BIGGARA B	
\$401013	01/01/1965	01/01/2017	07/11/1972	12/06/2019	30/06/1965	12/12/2018	207	44	481	R	T	C			DWR	PI	JINGELIC @ JINGELIC	
\$401014	01/01/1955	01/01/2017	26/09/1969	26/06/2019	01/01/1955	16/08/2017	320	48	449	R	T	C			DWR	FPS	TOOMA @ PINEGROVE	
\$401014B					01/01/1955	16/08/2017	320	48							DWR	FPS	TOOMA @ PINEGROVE B	
\$401015	01/01/1973	01/01/2017	17/12/1973	02/07/2019	17/12/1973	02/08/2016	187	30	222	R					DWR	SMS	BOWNA @ YAMBLA	
\$401016	01/01/1983	01/01/2017	15/06/1983	21/06/2019	15/06/1983	07/09/2018	113	6	167	R	T	C			DWR	PBM	WELUMBA @ THE SQUARE	
\$401017	01/01/1983	01/01/2017	06/07/1983	22/05/2019	06/07/1983	19/10/2017	113	8	183		T	C			DWR	SMS	MANNUS @ YARRAMUNDI	
\$401024	01/01/2003	01/01/2017	21/08/2003	26/06/2019	03/06/2003	16/08/2017	10	10	76		T	C			DWR	SPS	TUMBARUMBA @ BAKERS	
\$401026	01/01/2003	01/01/2017	16/12/2003	27/06/2019	16/12/2003	23/03/2018	113	12	53	R	T	C			DWR	SMS	MARAGLE @ GLOAMING	
\$401027	*		01/08/1969	13/05/2019											DWR	SFH	HUME DAM STORAGE	
\$401029	01/01/2011	01/01/2017	16/06/2011	22/05/2019	16/06/2011	03/10/2016	5	5	45	R					DWR	CR	MANNUS @ GLENROY2	
\$401204A					25/10/2000	03/11/2007	34	5							VFW	XFR	MITTA @ TALLANDON	
\$401211A					17/08/2000	24/07/2006	11	2							VFW	XFR	MITTA @ COLEMAN	
\$401224A															VFW	XFR	DARTMOUTH DAM	
\$401549	01/01/1956	01/01/2017	01/10/1983	26/06/2019	23/02/1956	22/12/2010	30	2	51						DWR	FPS	MURRAY @ BRINGENBONG	

Current gauging stations

Figure 31 - Upper Murray current gauging stations

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum of interested parties (1-5s)					Flow regime importance where applicable			Interested parties above					Importance	
				Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO
401007	TUMBARUMBA CREEK AT TUMBARUMBA NO.2	5/04/2000 UCTR	Level Flow Conductivity Temp Rain	20	34	18	13	8		22	18	16	5	8	4	4	2	
401008	MANNUS CREEK AT TOOMA	1/12/1947 UCTR	Level Flow Conductivity Temp Rain	17	24	13	13	8		12	8	8	4	6	3	3	2	
401009	MARAGLE CREEK AT MARAGLE	3/12/1947 UCTR	Level Flow Conductivity Temp Rain	20	34	18	13	8		22	18	16	5	8	4	4	2	
401012	MURRAY RIVER AT BIGGARA	21/07/1948 UCTR	Level Flow Conductivity Temp Rain	18	37	15	15	10		25	20	18	4	8	3	3	2	
401013	JINGELIC CREEK AT JINGELIC	30/06/1965 UCTR	Level Flow Conductivity Temp Rain	21	41	20	20	10		23	20	18	5	9	4	4	2	
401014	TOOMA RIVER AT PINEGROVE	4/02/1955 UCTR	Level Flow Conductivity Temp Rain	27	41	25	25	13		24	20	18	6	9	5	5	3	
401015	BOWNA CREEK AT YAMBLA	17/12/1973 LFR	Level Flow Rainfall	16	26			8		18	15	13	4	6	0		2	
401016	WELUMBA CREEK AT THE SQUARE	22/04/1983 UCTR	Level Flow Conductivity Temp Rain	20	34	18	13	8		12	8	8	5	6	4	4	2	
401017	MANNUS CREEK AT YARRAMUNDI	6/06/1983 UCTR	Level Flow Conductivity Temperature	20	35	18	18			22	18	16	5	8	4	4		
401024	TUMBARUMBA CREEK AT TOOMA (BAKERS)	8/07/2003 UCTR	Level Flow Conductivity Temperature	21	34	18	18			23	18	16	5	8	4	4		
401026	MARAGLE BACK CREEK AT GLOAMING	6/07/2002 UCTR	Level Flow Conductivity Temp Rain	17	19	13	13	8		5	3	2	4	5	3	3	2	
401027	MURRAY RIVER AT HUME DAM - STORAGE GAUGE NO.2	16/08/2002 LR	Level Rainfall	35				8					8					2
401029	MANNUS CREEK AT GLENROY NO.2	16/06/2011 LFR	Level Flow Rainfall	12	21			8		14	10	10	3	5				2
401549	MURRAY RIVER AT BRINGENBONG BRIDGE	23/02/1956 LF	Level Flow	25	37					20	20	20	4	7				

Current storages

Figure 32 - Upper Murray Current storages

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO
401027	MURRAY RIVER AT HUME DAM - STORAGE GAUGE NO.2	16/08/2002 LR	Level Volume Rain	#VALUE!	#VALUE!			#VALUE!		#VALUE!		0	5	10				2

Potential Upgrades

Nil

Potential Downgrades

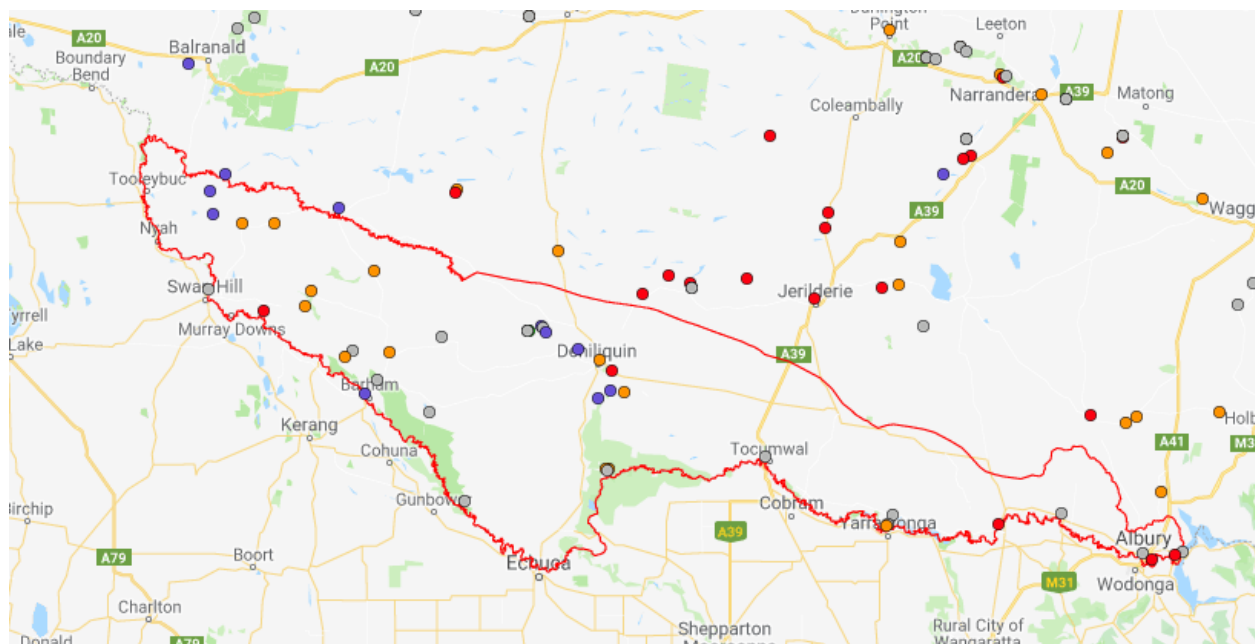
Figure 33 - Upper Murray (401) potential downgrade sites

STATION #	STNAME	COMMENCE	CURRENT PARAMETERS
401029	MANNUS CREEK AT GLENROY NO.2	16/06/2011	Level Flow Rainfall

Murray (409)

Telemetry Sites

Figure 34 - NSW extent of Murray (409) showing telemetered gauging stations - Source WaterNSW website



Data Inventory

Figure 35 - Data Inventory Murray (409) - Source WaterNSW website

SURFACE WATER Archive Data Inventory for 409-Murray River Basin																
S=Telemetered **Storage																
Station ID	FLOWS		HEIGHTS		RATINGS		No. No.		R A W C T		W H O		Discont.	Org. Net Code Class	NAME	
	Start	End	Start	End	First Starts	Last Starts	Last of Tab	No. of Gaug	at t o u	i m m u n	p n m y	u x d d g				
\$409001	01/01/1877	01/01/2017	08/10/1867	01/07/2020	01/01/1908	01/01/1976	100	21	141	T	C	F	O	DWR SFH	MURRAY @ ALBURY	
\$409002	01/01/1909	01/01/2017	12/07/1909	15/07/2020	01/01/1894	20/09/2017	241	66	909	T	C			DWR SFF	MURRAY @ COROMA	
\$409003	01/01/1889	01/01/2016	01/11/1870	26/05/2020	01/01/1800	16/07/2018	99	32	269	T	C		O	DWR SFF	EDWARD @ DENILQUIN	
\$409005	01/01/1905	01/01/2017	01/01/1913	23/06/2020	01/01/1900	29/09/2013	284	21	558	T	C	B	P	O	DWR SFF	MURRAY R @ BARRHAM
\$409006	01/01/1914	01/01/2017	03/11/1914	24/06/2020	01/01/1800	01/03/1986	105	5	104					DWR CH	MURRAY R @ GULPA	
\$409008	01/01/1933	01/01/2017	01/08/1987	24/06/2020	23/11/1918	21/12/2010	192	43	541	T	C			DWR SFF	EDWARD R @ OFFTAKE	
\$409013	01/01/1922	29/09/2016	03/01/1975	19/10/1998	01/02/1800	12/09/2017	512	71	633	T	C		O	DWR SFF	WAKOOL @ STONEY KIM	
\$409014	01/01/1918	01/01/2017	01/11/1870	09/06/2020	01/01/1915	28/10/2016	362	42	587	T	C		O	DWR SFS	EDWARD R @ MOULAMEIN	
\$409016	01/01/1929	01/01/2017	27/06/1969	11/06/2020	01/01/1800	20/12/2019	237	34	1125	T	C			DWR SFF	MURRAY @ HEYWOODS	
\$409017	01/01/1929	01/01/2017	01/11/1929	11/06/2020	23/08/1929	05/10/2016	452	102	1379	T	C			DWR SFF	MURRAY @ DOCTORS PNT	
\$409019	01/01/1936	01/01/2017	01/02/1936	26/05/2020	01/01/1800	04/08/2018	230	43	473					DWR SFS	WAKOOL R@OFFTAKE REK	
\$409020	01/01/1936	01/01/2017	01/02/1936	25/05/2020	01/01/1800	17/10/2016	205	76	523					DWR SFS	YALLAKOOL C@ OFFTAKE	
\$409021			01/05/1938	25/05/2020	01/01/1800	01/01/1800	1	1	1					DWR SFH	WAKOOL MAIN CANAL 01	
\$409022	01/01/1938	30/06/2012	01/05/1938	25/05/2020					267					DWR SFS	WAKOOL MAIN CANAL 01	
\$409023	01/01/1936	01/01/2017	01/02/1936	25/05/2020	01/01/1800	22/04/2017	273	32	493	R	T	C		DWR SFF	EDWARD R D/S STEVEN	
\$409024	01/01/1929	01/01/2017	22/10/1929	25/05/2020	01/01/1800	18/02/2019	218	47	539					DWR SFS	COLLIGEN C B/L REGUI	
\$409025	01/01/1938	01/01/2017	03/07/1938	15/07/2020	03/03/1960	22/08/2017	376	59	958	T	C	F	O	DWR SFF	MURRAY @ YARRAMONGA	
\$409029	01/01/1941	01/01/2017	15/09/1941	05/06/2020	01/01/1800	24/10/2016	105	4	182	T	C			DWR SFS	ESC FR MULMALA EDW	
\$409030	01/01/1914	01/01/2017	03/11/1914	24/06/2020	08/11/1914	08/09/2019	154	48	546					DWR SFS	GULPA CK @ OFFTAKE	
\$409035	01/01/1957	01/01/2017	20/10/1966	10/06/2020	01/01/1800	06/08/2014	202	32	860	T	C			DWR SFF	EDWARD R @ LIEMAH	
\$409036	01/01/1957	01/01/2017	20/04/1966	16/04/2020	29/08/1957	23/07/2017	229	80	396	T	C		O	DWR SFS	MERRAN CK U/S WAK R	
\$409037	01/01/1886	01/01/2016	17/02/1967	01/07/2020	26/01/1967	01/01/2018	101	2	3	T	C			DWR SFH	MURRAY @ HOMLONG	
\$409044	01/01/1972	01/01/2017	22/02/1972	23/06/2020	01/01/1800	05/09/2016	204	31	262	T	C		O	DWR SFS	LI MERRAN FRANK/ BE	
\$409045	01/01/1988	01/01/2017	24/05/1988	02/07/2020	01/01/1800	12/08/2012	132	15	191	T	C			DWR SFF	WAKOOL WAKOOL-BAR R	
\$409047	01/01/1989	01/01/2017	01/01/1989	22/06/2020	01/01/1800	23/12/2010	138	13	165	T	C		O	DWR SFS	EDWARD R @ TOONALOO	
\$409048	01/01/1983	01/01/2017	23/08/1983	12/06/2020	01/01/1800	12/08/2012	144	16	190	T	C			DWR SFS	NIEMUR R BARR-MLN R	
\$409056	01/01/1985	01/01/2017	18/12/1985	07/05/2020	01/01/1800	19/02/2020	331	37	182	R	T	C		DWR SFF	TUPPAL @ APATULA RD	
\$409061	01/01/1983	01/01/2017	23/08/1983	09/04/2020	01/01/1800	28/02/2014	143	24	134	T	C			DWR SFF	WAKOOL R COONAMIT BE	
\$409062	01/01/1983	01/01/2017	23/08/1983	11/06/2020	01/01/1800	19/08/2018	142	18	136	T	C		O	DWR SFF	WAKOOL R GEEGEE BR 1	
\$409075	01/01/1991	01/01/2017	20/11/1991	10/02/2020	01/01/1800	28/06/2019	160	17	115	T	C			DWR SFS	BULLATALE U/S EDWARI	
\$409086	01/01/1994	01/01/2017	21/06/1994	16/04/2020	01/01/1800	30/05/2015	155	15	144	T	C		O	DWR SFF	NIEMUR @ MALLAN SCH	
\$409088	01/01/1998	01/01/2017	17/11/1998	25/06/2020	01/01/1800	19/12/2017	181	47	128	T				DWR SFS	WADDY CK D/S REGULA	
\$409101	*		07/03/1936	25/03/2020					3					DWR CH	EDWARD U/S STEVENS	
\$409107	01/01/2006	01/01/2016	07/06/2006	11/06/2020	07/06/2006	03/05/2019	36	16	62					DWR SFS	ST HELENA DS REGULAT	
\$409108														XFR	MURRAY @ MULMALA OT	
\$409109			25/09/2011	27/04/2020					24	T	C	F	O	DWR FUI	THULE @ LOW THULE RD	
\$409111			28/09/2011	11/02/2020					22	T	C	F	O	DWR FUI	BARBER @ SANDY BR.	
\$409113			01/08/2014	27/04/2020					15	R	T	C	F	O	DWR	Barbers @ Pool
\$409114			11/08/2014	03/03/2020					26	T				DWR	KFF OFFTAKE	
\$409115														DWR	DISC	Wakool Town Escape
\$409202A					01/04/2002	10/08/2008	60	5						VRW	XFR	MURRAY AT TOONMAL
\$409204C					30/10/2001	13/10/2006	33	2						LGA	XFR	MURRAY R @ SWAN HILL
\$409216A														VRW	XFR	MURRAY U/S Y'WONGA

Current gauging stations

Figure 36 - Murray (409) current gauging stations

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum of interested parties (1-5)					Flow regime importance where applicable	Interested parties above					Importance			
				Level	Flow	EC	Temp.	Rain		DO	Level	Flow	EC	Temp.	Rain	DO		
409001	MURRAY RIVER AT ALBURY (UNION BRIDGE)	14/04/1892 LCT	Level Conductivity and Temperature	30	43	15	20											
409002	MURRAY RIVER AT COROWA	03/04/1894 LVCT	Level Flow Conductivity Temperature	28	43	15	20			18	15	15			6	9	4	4
409003	EDWARD RIVER AT DENILIGUN	03/09/1896 LVCT	Level flow EC DO	36	51	15	28			25	24	24			8	11	4	6
409005	MURRAY RIVER AT BARRHAM	1/01/1905 LVCT	Level flow EC DO	33	48	15	25			20	19	19			7	10	4	5
409008	EDWARD RIVER AT OFFTAKE	23/11/1918 LVCT	Level Flow Conductivity Temperature	28	45	15	20			20	19	19			6	10	4	5
409013	WAKOOL RIVER AT STONEY CROSSING	16/06/1922 LVCT	Level flow EC DO	36	47	18	28			23	20	20			8	10	6	6
409014	EDWARD RIVER AT MOULAMEIN	1/01/1905 LVCT	Level flow EC DO	34	46	15	25			20	19	19			7	10	4	5
409016	MURRAY RIVER AT DOWNSTREAM HUME DAM (HEYWOODS)	6/02/1929 LVCT	Level Flow Conductivity Temperature	28	41	15	20			17	14	14			6	8	3	3
409017	MURRAY RIVER AT DOCKERS POINT	23/08/1929 LVCT	Level Flow Conductivity Temperature	36	51	18	18			27	24	24			8	11	4	4
409019	WAKOOL RIVER AT OFFTAKE REGULATOR	3/07/1935 LF	Level Flow	27	41					26	24	24			6	9		
409020	YALLAKOOL CREEK AT OFFTAKE	3/07/1935 LF	Level Flow	27	38					24	20	20			6	8		
409023	EDWARD RIVER DOWNSTREAM OF STEVENS WEIR	3/07/1935 LVCT	Level Flow Conductivity Temperature	43	56	18	23			27	24	24			9	12	5	5
409025	MURRAY RIVER DOWNSTREAM YARRAWONGA WEIR	12/05/1938 LVCT	Level Flow Conductivity Temperature	41	51	18	23			29	24	24			9	11	5	5
409029	ESCAPE FROM MULWALA CANAL AT EDWARDS RIVER	1/01/1940 LVCT	Level Flow Conductivity Temperature	25	34	15	15			19	14	14			5	8	3	3
409030	GULPA CREEK AT OFFTAKE	8/11/1914 LF	Level Flow	25	36					25	20	20			6	8		
409035	EDWARD RIVER AT LISWAM	21/01/1957 LVCT	Level Flow Conductivity Temperature	32	44	18	18			26	24	24			7	10	4	4
409036	MERRAN CREEK AT UPSTREAM OF WAKOOL RIVER	4/04/1957 LVCT	Level flow EC DO	32	42	15	24			19	15	15			6	8	4	4
409037	MURRAY RIVER AT HOWLONG	26/01/1967 LCT	Level Conductivity and Temperature	18			15								4	3	3	3
409044	LITTLE MERRAN CREEK AT FRANKLINGS BRIDGE	26/02/1972 LVCT	Level flow EC DO	28	37	15	20			21	19	19			6	8	4	4
409045	WAKOOL RIVER AT WAKOOL-BARRHAM ROAD	15/11/1965 LVCT	Level Flow Conductivity Temperature	34	46	15	25			28	24	24			7	10	4	5
409047	EDWARD RIVER AT TOONALOOK	4/12/1979 LVCT	Level Flow Conductivity Temperature	35	50	15	28			26	24	24			8	11	4	6
409048	NIEBUR RIVER AT BARRHAM - MOULAMEIN ROAD	23/08/1983 LVCT	Level flow EC DO	34	42	15	25			19	15	15			7	9	4	4
409056	TUPPAL CREEK AT ABATULA ROAD	18/12/1985 LVCT	Level Flow Conductivity Temperature	29	37	15	15			19	15	15			6	8	3	3
409061	WAKOOL RIVER AT COONAMIT BRIDGE	5/04/1990 LVCT	Level Flow Conductivity Temperature	29	38	15	15			19	17	17			6	9	3	3
409062	WAKOOL RIVER AT GEE GEE BRIDGE (NO.2)	15/02/1989 LVCT	Level Flow Conductivity Temperature	34	43	15	25			19	17	17			7	10	4	5
409075	BULATALE CREEK AT UPSTREAM OF EDWARD RIVER	20/11/1991 LVCT	Level Flow Conductivity Temperature	29	35	15	15			18	14	14			6	8	3	3
409086	NIEBUR RIVER AT MALLAN SCHOOL	23/03/1994 LVCT	Level flow EC DO	34	40	15	25			17	13	13			7	9	5	5
409096	WADCOY CREEK AT DOWNSTREAM OF REGULATOR	1/09/1998 LF	Level Flow	24	38					15	15	15			5	6	6	6
409107	SAINT HELENA CREEK AT DOWNSTREAM REGULATOR	7/06/2006 LF	Level Flow	22	38					20	20	20			5	6	6	6
409109	THULE CREEK AT LOWER THULE ROAD	27/10/2011 LVCTDP	Level Velocity Flow EC Temp DO pH	32	36		20			20	20	20			7	8	4	4
409111	BARRIER CREEK AT SANDY BRIDGE ROAD	27/10/2011 LVCTDP	Level Velocity Flow EC Temp DO pH	32	36		20			15	15	15			7	8	4	4
409113	BARRIER CREEK AT BARRIER POOL	1/08/2014 LVCTDP	Level Velocity Flow EC Temp DO pH	22	27		15			10	10	10			5	6	3	3
409114	KPF OFFTAKE DOWNSTREAM OF REGULATOR	1/08/2014 LVF	Level Velocity Flow	27	31					20	20	20			6	7		

Current storages

Nil

Potential Upgrades

Nil

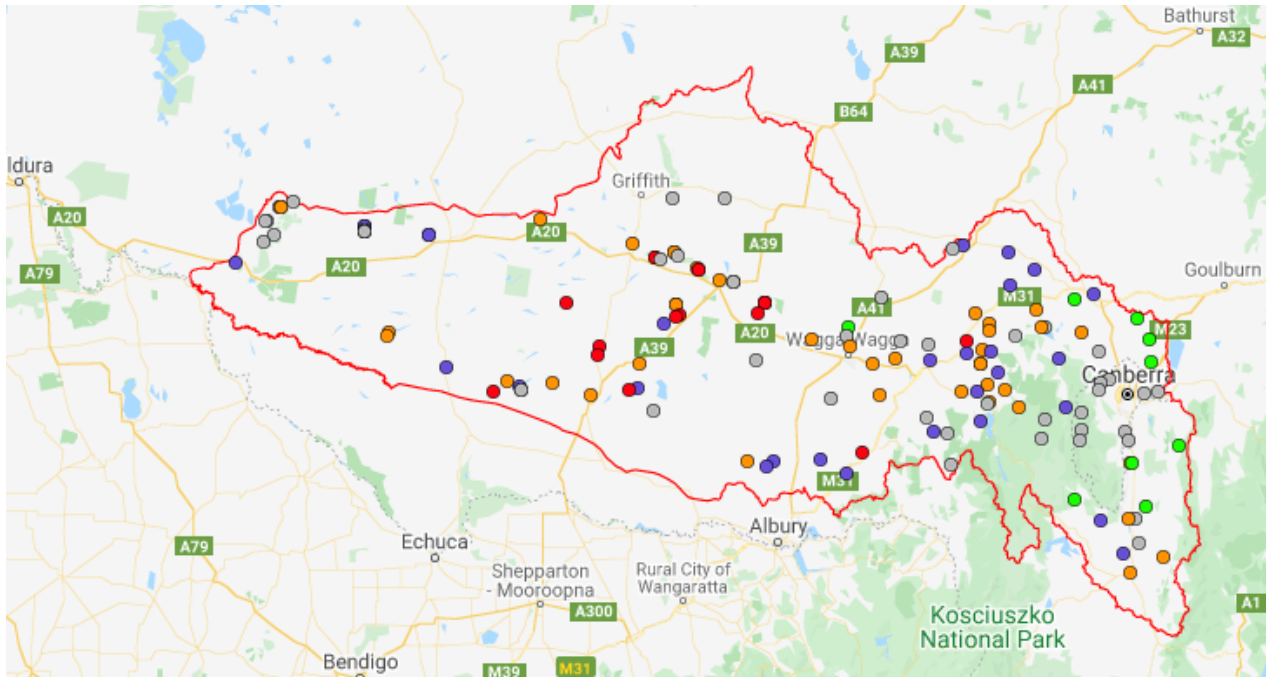
Potential Downgrades

Nil

Murrumbidgee (410)

Telemetry Sites

Figure 37 - Murrumbidgee (410) showing telemetered gauging stations - Source WaterNSW website



Data Inventory

Figure 38 - Data Inventory Murrumbidgee (410) Part 1 of 3 - Source WaterNSW website

SURFACE WATER Archive Data Inventory for 410-Murrumbidgee River Basin																
S=Telemetered **Storage																
Station ID	FLOWS		HEIGHTS		RATINGS		No. No.		RAWCT		WHO		Discont.		Org. Net	
	Start	End	Start	End	First Starts	Last Starts	Last Tab	of Tab	of Gaug	n p p	d b b	H d d	g	Date	Code	Class
072052																
072169																
073019																
4100001	01/01/1969	01/01/2021	02/01/1844	10/06/2020	01/01/1950	23/05/2019	160	67	740							
410000200	01/01/2012	01/01/2017	17/04/2012	18/06/2020	17/10/2001	01/10/2016	20	4	85							
410000207	01/01/2004	01/01/2017	01/07/2004	21/05/2020	01/07/2004	19/06/2016	6	5	43	R						
410000208	01/01/2004	01/01/2017	17/06/2004	03/06/2020	17/06/2004	09/12/2010	2	2	86							
410000209	01/01/2006	01/01/2017	01/08/2006	06/05/2020	01/08/2006	10/12/2017	6	6	77							
410000210	01/01/2006	01/01/2017	01/08/2006	01/06/2020	01/07/2006	15/06/2018	7	7	74							
410000212																
410000213	01/01/2006	01/01/2014	18/05/2006	20/05/2020	01/12/2005	04/08/2017	10	6	61							
410000236																
410000240																
410000244																
410000254	01/01/2011	01/01/2017	03/02/2011	14/05/2020	01/01/1990	25/08/2015	5	4	43							
410000255																
410000256																
410000260	01/01/2011	01/01/2017	10/05/2011	04/05/2020	03/05/2011	06/06/2016	5	2	52							
410000261	01/01/2012	01/01/2017	13/06/2012	03/06/2020	01/01/2000	30/09/2016	2	3	53	R						
410000263																
410000269	01/01/2012	01/01/2017	09/05/2012	14/06/2020	01/01/2000	16/07/2014	5	3	47	R						
410000270																
410000271	01/01/2012	01/01/2017	24/08/2012	01/05/2020	12/07/2012	12/07/2012	1	1	45	R						
410000272	01/01/2013	01/01/2017	23/04/2013	05/05/2020	23/04/2013	23/04/2013	1	1	45	R						
410000275																
410000279																
410000280																
410000281	01/01/1954	01/01/2017	13/11/1969	21/05/2020	27/10/1954	15/02/2019	120	16	97							
410000282																
410000283																
4100004	01/01/1986	01/01/2017	26/06/1986	15/06/2020	01/07/1986	02/10/2016	155	57	941							
4100005	01/01/1991	01/01/2017	01/11/1992	02/09/2019	01/10/1915	05/08/2017	189	85	960							
4100006	01/01/1900	01/01/2017	26/08/1983	17/06/2020	27/04/1992	13/10/2016	270	67	936							
4100007	01/01/1902	01/01/2017	20/10/1961	26/05/2020	01/08/1912	01/08/2010	165	91	856							
4100008	01/01/1961	01/01/2017	18/07/1961	27/05/2020	18/07/1961	07/09/2016	29	5	315							
4100012	01/01/1912	01/01/2017	07/05/1973	06/05/2020	06/08/1948	01/08/2016	133	11	314							
4100013	01/01/1912	01/01/1961	12/08/2012	17/06/2020	01/01/1965	20/03/2012	130	8	500							
4100014	01/01/1978	01/01/2017	01/10/1978	20/05/2020	25/05/1973	06/03/2020	150	22	631							
4100015	01/01/1913	01/01/2017	07/03/1977	27/05/2020	27/02/1973	24/12/2019	170	27	639							
4100016	01/01/1912	01/01/2017	01/08/1912	30/06/2020	01/08/1912	06/05/2019	132	57	477							
4100017	01/01/1913	01/01/2017	08/06/1913	01/07/2020	01/01/1800	23/02/2013	175	23	427							
4100021	01/01/1914	01/01/2017	05/07/1956	21/05/2020	01/02/1970	29/05/2018	170	20	621							
4100023	01/01/1912	01/01/2017	01/01/1913	09/06/2020	01/12/1860	04/08/2017	145	14	301							
4100024	01/01/1914	01/01/2017	19/09/1914	12/05/2020	19/09/1914	15/12/2018	40	32	494							
4100025	01/01/1914	01/01/2017	01/02/1914	17/03/2020	01/01/1900	03/09/2016	454	56	460	R						
4100026	01/01/1915	01/01/2017	24/08/1915	14/05/2020	01/08/1915	26/02/2018	216	16	366							
4100033	01/01/1900	31/12/2100	01/02/1916	01/05/2020	01/01/1916	29/01/2020	230	74	661							
4100036	01/01/1928	01/01/2017	04/08/1958	26/05/2020	02/10/1970	22/09/2016	210	23	703							
4100038	01/01/1932	01/01/2017	31/05/1967	15/06/2020	22/04/1932	30/09/2016	340	75	574							
4100039	01/01/1932	01/01/2017	28/08/1970	27/04/2020	06/05/1932	01/10/2016	260	57	493							
4100040	01/01/1936	01/01/2017	10/06/1974	05/05/2020	06/03/1971	16/08/2017	220	25	538							
4100041	01/01/1936	01/01/2017	01/12/1952	03/06/2020	23/11/1955	29/09/2016	130	49	528							

Figure 39 - Data Inventory Murrumbidgee (410) Part 2 of 3 - Source WaterNSW website

Station ID	FLOWS		HEIGHTS		RATINGS		No. No.		RAWCT		WHO		Discont.	Org. Net	NAME	
	Start	End	Start	End	First Starts	Last Starts	Last of Tab	No. of Tabs	at m n p p d b H d d g	to u x	i u x	Date				
\$410043	01/01/1938	01/01/2017	21/08/1984	29/06/2020	03/05/1938	20/01/2020	165	24	178	T	C			DWR	FFS	HILLAS @ MOUNT ADAM
\$410044	01/01/1938	01/01/2017	05/05/1938	12/03/2020	01/01/1900	01/10/2016	535	36	441	T	C			DWR	PI	MUTTANA CK @ COOLAC
\$410047	01/01/1938	01/01/2017	06/10/1976	18/06/2020	01/05/1938	23/01/2020	544	45	506	T	C			DWR	FFS	TARCUTTA @ BORAMBOLA
\$410048	01/01/1938	01/01/2017	10/05/1938	06/05/2020	10/05/1938	16/01/2017	145	51	281	T	C B			DWR	FFS	KYEAMBA @ LADYSMITH
\$410050	01/01/1900	31/12/2100	13/02/1939	28/04/2020	11/04/1939	20/11/2018	87	35	479	T	C B			DWR	FFS	M/BIDGEE BILLILLINGRA
\$410057	01/01/1900	31/12/2100	26/08/1983	03/06/2020	01/01/1900	03/10/2016	135	23	548	R	T	C		DWR	PI	GOGBA/GHNSA LACHALAC
\$410058	01/01/1946	01/01/2017	30/05/1978	25/06/2020	01/06/1946	09/01/2018	130	17	366					DWR	FFS	TARCUTTA @ WESTBROOK
\$410059	01/01/1946	01/01/2017	01/01/1946	23/06/2020	13/06/1946	20/01/2020	175	58	504	T				DWR	CR	GILMORE @ GILMORE
\$410060	01/01/1947	01/01/2017	18/11/2005	05/05/2020	27/11/1946	04/10/2016	120	9	128					DWR	CH	NIMMING POLLEN OFFTKE
\$410061	01/01/1947	01/01/2017	11/09/1947	24/06/2020	01/09/1947	01/09/2012	190	18	416	T	C			DWR	PI	ADELONG @ BAILLOW RD
\$410062	01/01/1900	31/12/2100	01/12/1947	12/05/2020	01/01/1947	04/02/2019	190	23	457					DWR	PI	MURERALLA SCHOOL
\$410068	01/01/1984	01/01/2017	22/01/1984	26/05/2020	15/01/1984	08/10/2016	7	7	164	T	C			DWR	SFF	M/BIDGEE @ GLENDALE
\$410073	01/01/1984	01/01/2017	28/05/1984	17/06/2020	12/03/1984	22/04/2017	270	33	594	T	C			DWR	SFF	TURUT @ ODDYS EDGE
\$410076	01/01/1985	01/01/2017	17/09/1974	04/05/2020	07/02/1971	06/06/2016	215	20	446					DWR	PI	STRIKE-A-LIGHT CREEK
\$410081	01/01/1986	01/01/2017	13/12/1986	28/04/2020	12/12/1986	20/08/2019	220	24	353	T	C B			DWR	PI	COOMA CK @ COOMA NO2
\$410082	01/01/1988	01/01/2017	03/03/1965	20/05/2020	16/07/1959	25/12/2017	240	45	426					DWR	CR	M/BIDGEE D/S GOGEL W
\$410088	01/01/1944	01/01/2017	31/07/1959	01/06/2020	31/07/1959	04/10/2016	160	17	330					DWR	PI	GOODRADIGREE B/BELLA
\$410090	01/01/1965	01/01/2017	28/05/1965	13/05/2020	01/01/1900	08/03/2014	18	19	189	T	C			DWR	SMS	YASS RV @ GUNDAROO
\$410091	01/01/1965	01/01/2017	12/05/1981	17/06/2020	18/06/1965	07/05/2019	122	43	298	T	C			DWR	FFS	B'BONG @ WALBUNDRIE
\$410092	01/01/1965	01/01/2017	31/12/1975	16/07/2020	01/05/1965	07/03/2015	160	31	274	T	C			DWR	CR	CUNNINGHAMS @ HARGEN
\$410093	01/01/1965	01/01/2016	22/07/1976	10/06/2020	02/09/1974	28/02/2020	155	16	392	T	C			DWR	SFS	OLD MAN CK @ KVMONG
\$410097	01/01/1967	01/01/2017	01/07/1976	17/06/2020	29/09/1970	06/05/2019	202	27	284	T	C			DWR	PI	BILLABONG @ABERFELDY
\$410102	*		21/10/1975	21/02/2011										DWR	SFH	BLOWERING DAM
\$41010287	*		17/10/2011	05/05/2020					3					DWR	SFH	NIMMIE STORAGE
\$410103	01/01/1965	01/01/2017	24/06/1965	22/06/2020	24/06/1965	07/03/2019	140	7	80	T	C			DWR	PI	MOULAGHANS @DOWNSIDE
\$41010309	01/01/2014	01/01/2017	29/08/2014	07/05/2020	16/05/2003	29/08/2014	99	20	121	T				DWR	SFH	FOREST @ OFFTAK
\$41010399														DWR	CR	FOREST U/S OFFTAK
\$410106	01/01/1972	01/01/2017	19/11/1978	23/06/2020	01/01/1972	30/09/2016	155	11	235	T	C			DWR	FFS	GILMORE @ WYBALENA
\$410107	01/01/1972	01/01/2017	19/05/1972	12/05/2020	19/05/1972	07/08/2019	270	34	276					DWR	PI	MOUNTAIN CK @ MTN CK
\$410108	01/01/1992	01/01/2017	03/12/1992	01/07/2020	01/01/1900	19/02/2019	125	8	219	T	C			DWR	SFS	D C 900 @ OUTFALL
\$41010810	01/01/1999	01/01/2017	16/11/1999	23/04/2020	01/01/1800	29/10/2016	38	14	105					DWR	SFS	B'BONG @ MANGANELLA
\$41010904	*		13/03/2004	18/06/2020						R	T	C		DWR	SFH	BEREMBED STORAGE
\$41010922	*		06/06/2006	20/05/2020										DWR	SFH	GOGELDRIE STORAGE
\$41010928	*		18/06/2006	05/05/2020										DWR	SFH	HAY STORAGE
\$41010941	*		23/11/2006	05/05/2020										DWR	SFH	MAUDE STORAGE
\$41010966	*		28/08/2006	17/02/2020										DWR	SFH	REDBANK STORAGE
\$41010969			02/09/2003	16/04/2020					49					DWR	SFH	INLET TOMBULLEN
\$41010970	01/01/2009	01/01/2017	17/06/2009	14/04/2020	21/09/2014	12/10/2016	105	2	35					DWR	SFH	TOMBULLEN D/S WEIR
\$41010971	*		17/06/2008	27/03/2020										DWR	SFH	TOMBULLEN STORAGE
\$41010981	*		01/07/2003	16/04/2020										DWR	SFH	YANCO STORAGE
\$410110	01/01/1977	01/01/2014	08/03/1977	01/07/2020	08/03/1977	07/06/2019	145	10	224	T	C			DWR	CR	D C 900 @ OUTFALL
\$410112	01/01/1975	01/01/2017	19/08/1975	21/08/2020	01/06/1975	09/01/1996	120	4	160	R				DWR	SMS	JINDALEE @ JINDALEE
\$410114	01/01/1975	01/01/2017	28/05/1975	01/06/2020	01/05/1975	14/10/2010	120	5	218	R				DWR	SMS	KILLINGCAT @ WYANGLE
\$410128									207			31/12/1996		DWR	XFR	COLLEENBALLY OFFTAK
\$410130	01/01/1979	01/01/2017	21/06/1979	17/03/2020	01/01/1979	07/11/2016	143	12	287	T	C		O	DWR	SFF	M/BIDGEE D/S BALRAND
\$410131	*		01/07/1974	16/07/2020						R	T			DWR	SFH	BURRINJUCK DAM
\$410133	01/01/1993	01/01/2017	25/02/1993	02/07/2020	01/01/1800	09/04/2020	405	64	132	T	C			DWR	SFS	COLLEENBALLY DR BUNDY
\$410134	01/01/1978	01/01/2017	28/04/1978	25/06/2020	01/01/1800	24/08/2016	157	21	302	T	C B F			DWR	SFF	BILLABONG @ CARLOT
\$410136	01/01/1981	01/01/2017	31/12/1981	05/05/2020	03/07/1979	16/08/2017	180	16	229					DWR	SFF	M/BIDGEE DS HAY WEIR
\$410137	01/01/1999	01/01/2017	13/05/1999	10/06/2020	16/04/1999	08/11/2018	70	11	149	R				DWR	SFF	BEAVERS CK MUNDOWEY
\$410138					30/10/1985	30/10/1985	100	1	53			29/10/1993		DWR	XFR	M CANAL D/S BUNDING
\$410141	01/01/1982	01/01/2017	20/05/1982	05/05/2020	20/05/1982	02/08/1990	115	3	198	T	C B			DWR	SMS	MICALIGO @ MICALIGO

Figure 40 - Data Inventory Murrumbidgee (410) Part 3 of 3 - Source WaterNSW website

Station ID	FLOWS		HEIGHTS		RATINGS		No. No.		RAWCT		WHO		Discont.	Org. Net	NAME	
	Start	End	Start	End	First Starts	Last Starts	Last of Tab	No. of Tabs	at m n p p d b H d d g	to u x	i u x	Date				
\$410143			30/08/1974	19/05/2020	01/01/1970	01/01/1970	100	1						DWR	CH	M/BIDGEE ERINGARRAH
\$410148	01/01/1980	01/01/2014	01/09/1980	08/07/2020	01/01/1800	01/09/2017	142	11	162	T	C			DWR	SFS	FOREST WARRISTONWEIR
\$410152	01/01/1984	01/01/2016	17/04/1984	19/06/2020	26/01/1984	03/03/2012	155	11	132					DWR	SMS	STONY @ EDWARDSTOWN
\$410155			28/10/1999	25/06/2020	02/10/1985	02/10/1985	100	1	3	R				DWR	CF	TARCUTTA BELMORE BR
\$410156	01/01/1985	01/01/2017	19/02/1985	16/06/2020	17/06/1985	27/05/2015	17	17	125	R	T C B			DWR	SMS	KYEAMBA @ BOOK BOOK
\$410160	01/01/1988	01/01/2017	22/06/1988	13/05/2020	01/07/1988	01/02/1989	110	2	80	R				DWR	SMS	WILLIAMS @ WHITEHILL
\$410168	01/01/1995	01/01/2017	21/09/1995	01/07/2020	01/09/1995	20/10/2016	142	16	144	T	C			DWR	SFF	BILLABONG @ HARTWOOD
\$410169	01/01/1995	01/01/2017	18/09/1995	27/05/2020	18/09/1995	24/03/2012	35	6	128	T	C			DWR	SFF	YANCO @ YANCO BRIDGE
\$410170	01/01/1995	01/01/2017	20/09/1995	30/06/2020	06/08/1995	10/03/2019	123	11	134	T	C			DWR	SFF	B/BONG U/S INNES BDG
\$410173	01/01/2011	01/01/2012	01/02/2011	05/05/2020	01/01/1985	30/04/2018	118	9	83					DWR	CH	CAIRA CREEK @ OFFTAK
\$410175	01/01/2012	01/01/2017	12/08/2012	05/05/2020	14/06/1998	01/06/2004	10	2	62					DWR	CH	CAIRA NORTH
\$410176	01/01/1999	01/01/2017	10/05/1999	12/05/2020	01/08/1998	03/12/2010	11	3	117	T	C			DWR	FFS	YASS @ U/S B/JUCK
\$410182	01/01/2001	01/01/2017	04/06/2001	17/06/2020	01/03/2001	06/05/2019	26	7	90	T	C			DWR	SFS	BILLABONG @ HILLVIEW
\$410183	01/01/2001	01/01/2017	05/06/2001	26/05/2020	02/05/2001	06/05/2019	13	7	89	T	C			DWR	SFS	BILLABONG @ PARKSIDE
\$410185			07/02/2001	29/06/2020					45	T	C			DWR	FJI	MOWRANIE D/S B/BONG
\$410186	01/01/2001	01/01/2017	30/08/2001	26/05/2020	26/02/2001	24/09/2018	55	10	86	T	C			DWR	FFS	B/BONG D/S 10-MTN CK
\$410187	01/01/2001	01/01/2017	29/08/2001	18/06/2020	28/08/2001	03/10/2016	25	4	63	T	C			DWR	SMS	TEN MILE @H/BROOK #3
\$410190									15					DWR	XFR	BUNDIDGERRY STORAGE
\$410191	01/01/2002	01/01/2017	07/05/2004	16/10/2013	01/10/2002	03/12/2017	115	4	47	T	C			DWR	CR	CCD @ CUTFALL
\$410198	01/01/2002	01/01/2017	22/04/2002	22/04/2020	11/04/2002	18/12/2019	9	9	110	T	C			DWR	SFF	M/BIDGEE U/S GOBARRA
\$410199	01/01/2012	01/01/2017	17/04/2012	18/06/2020	01/11/2007	06/09/2010	4	2	86					DWR	FJI	TUMUT U/S NIMBO O/T
410851	01/01/1996	01/01/2017	24/01/1996	13/05/2020	26/02/1976	06/02/2010	3	3	90					DWR	SMS	YASS @ MACKS REEF
\$72028										R				DWR		UPPER GOOB RAINFALL
\$72031										R				DWR		PEPPERCON RAINFALL
\$73015										R				DWR		MUNDARLO RAINFALL
\$73016					10/11/2006	10/11/2006	1	1		R				DWR		ADJUNGBILLY RAINFALL

Current gauging stations

Figure 41 - Murrumbidgee (410) current gauging stations 1 of 3

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum of interested parties (1-5)					Flow regime importance where applicable				Interested parties above					Importance			
				Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO			
410001	MURRUMBIDGE RIVER AT WAGGA WAGGA	01/01/1885 LVFCT	Level Velocity Flow Cond and Temp	45	57			31		34	34	34	10	12			7				
4100020	NIMBO CREEK AT DOWNSTREAM OFFTAKE	29/10/1991 LF	Level Flow	18	12					6	7	9	3	4							
4100026	NUMERALLA RIVER AT ROSE VALLEY ROAD BRIDGE	21/05/1997 GQ	Gaugings and Ratings	18	24					16	18	20	7	9							
4100027	MUTTAMA CREEK AT BERTHONG ROAD	1/07/2004 LFR	Level Flow Rainfall	17	24			14		10	13	14	4	6			3				
4100028	MOLONGLO RIVER AT KOBADA	17/06/2004 LF	Level Flow	10	14					10	9	9	3	4							
4100029	YANCO CREEK AT WIRRA	1/08/2006 LF	Level Flow	22	33					22	24	24	5	8							
4100030	COLOMBO CREEK AT COONONG WEIR	1/08/2006 LF	Level Flow	17	26					15	15	15	4	6							
4100034	JUGIONG CREEK AT CUMBAHURRA NO.2	3/02/2011 LF	Level Flow	15	22					13	16	19	4	6							
4100035	NORTH REDBANK CHANNEL AT GLENDEE	17/08/2011 LVF	Level Velocity Flow	16	24					15	18	18	4	6							
4100036	NORTH REDBANK CHANNEL AT ATHEN	18/08/2011 LVF	Level Velocity Flow	16	24					15	18	18	4	6							
4100040	MURRUMBIDGE RIVER AT YADOU NO.2	10/05/2011 LF	Level Flow	15	24					18	18	17	4	6							
4100041	GOGARRAGANDORA RIVER AT MAC'S CROSSING	13/06/2012 LFR	Level Flow Rainfall	17	26			14		15	18	19	4	6			3				
4100049	BRUNGLE CREEK AT RED HILL NO.2	9/05/2012 LFR	Level Flow Rainfall	17	21			14		10	10	10	4	5			3				
4100070	BREBBO RIVER AT BREBBO STATION	20/08/2012 LCTUR	Level Cond Temp Turbidity Rain	14		9	9	10		0	0	0	4		2	2	2				
4100071	ALLUM CREEK AT JONES PLAIN ROAD	27/08/2012 LUCTUR	Level Flow Cond Temp Turbid Rain	12	15	9	9	10		4	4	4	3	4	2	2	2				
4100072	MURRUMBIDGE RIVER UPSTREAM MICHELAGO CREEK	23/04/2012 LUCTUR	Level Flow Cond Temp Turb pi Rain	19	25	9	9	10		13	13	13	6	10	2	2	2				
4100079	BROOKING CREEK AT HOLLES ROAD	20/04/2016 LR	Level Rainfall	9				10		0	0	0	3				2				
4100080	BURKES CREEK AT MANISLOAH	4/05/2016 LR	Level Rainfall	13				14		0	0	0					3				
4100081	MURRUMBIDGE RIVER AT CARATHOOL BRIDGE	2/05/2017 LF	Level Flow	29	31					26	0	0	6	7							
4100082	MIRROOL CREEK AT BARELLAN ROAD	8/08/2017 LR	Level Rainfall	9				10		0	0	0	2				2				
4100084	MURRUMBIDGE RIVER AT GUNDAGAI	01/07/1886 LVFCT	Level Velocity Flow Cond and Temp	39	51			24		27	29	29	8	11			5				
4100095	MURRUMBIDGE RIVER AT NARRANDERA	02/05/1891 LVFT	Level Velocity Flow and Temperature	32	47			17		32	34	34	7	10							
4100096	TUMUT RIVER AT TUMUT	27/06/1882 LF	Level Flow	27	39					25	27	27	6	9							
410007	YANCO CREEK AT OFFTAKE	1/03/1918 LF	Level Flow	27	45					27	29	29	6	10							
410008	MURRUMBIDGE RIVER AT D'S BURRINLUCK DAM	10/10/1944 LUCT	Level Flow Conductivity Temperature	37	48	18	33			27	27	27	8	11	5	7					
410011	BILLABONG CREEK AT COCKNEEDGEDONS	4/02/2000 LUCT	Level Flow Conductivity Temperature	32	45	15	15			23	29	27	5	7	3	3					
410013	MAIN CANAL AT BEREMBED	25/10/1911 LF	Level Flow	14	27					14	14	14	3	7							
410014	COLOMBO CREEK AT MORUNDAH	10/07/1912 LF	Level Flow	31	40					20	20	20	7	9							
410015	YANCO CREEK AT MORUNDAH	13/07/1912 LF	Level Flow	33	43					22	24	24	7	10							
410016	BILLABONG CREEK AT JERILDRIE	19/07/1912 LF	Level Flow	24	35					21	23	24	5	8							
410017	BILLABONG CREEK AT CONARIGO (PUCKAWIDGEE)	23/07/1912 LF	Level Flow	24	35					21	23	24	5	8							
410021	MURRUMBIDGE RIVER AT DARLINGTON POINT	1/01/1914 LF	Level Flow	32	46					32	34	34	7	10							
410021	MURRUMBIDGE RIVER AT D'S BEREMBED WEIR	17/06/1917 LUCT	Level Flow Conductivity Temperature	31	40	10	19			25	25	25	5	8			4				
410024	GOODRADIGBEE RIVER AT WEE JASPER (KASHMIR)	19/09/1914 LUCT	Level Flow Conductivity Temperature	31	47	15	24			25	25	23	7	10	4	5					
410025	JUGIONG CREEK AT JUGIONG (INVERLOCKIE)	1/02/1914 LUCTR	Level Flow Conductivity Temp Rain	32	45	15	24	17		22	24	22	7	10	4	5	4				
410026	YASS RIVER AT YASS	24/08/1915 LF	Level Flow	31	29					30	30	28	8	11							
410033	MURRUMBIDGE RIVER AT MITTAGANS CROSSING	1/07/1916 LF	Level Flow	36	51					30	30	28	8	11							
410036	MURRUMBIDGE RIVER AT DOWNSTREAM YANCO WEIR	16/03/1924 LF	Level Flow	36	45					27	29	29	8	11							
410038	ADJUNGBILLI CREEK AT DARLALAJA	2/05/1927 LF	Level Flow	36	46					27	29	27	8	11							
410039	TUMUT RIVER AT BRUNGLE BRIDGE	6/05/1932 LVFT	Level Velocity Flow and Temperature	27	39			14		17	19	15	6	9			3				
410040	MURRUMBIDGE RIVER AT DOWNSTREAM MAUDE WEIR	1/09/1936 LFD	Level Flow DO	41	51				27	32	34	34	9	12				6			
410041	MURRUMBIDGE RIVER AT DOWNSTREAM REDBANK WEIR	13/05/1937 LFD	Level Flow DO	34	42				27	32	34	34	9	12				6			
410044	HILLAS CREEK AT MOUNT ADAM	3/05/1938 LUCT	Level Flow Conductivity Temperature	31	49	14	23			27	29	27	7	11	4	5					
410044	MUTTAMA CREEK AT COOLAC	5/05/1938 LUCT	Level Flow Conductivity Temperature	32	47	14	23			22	24	22	7	10	4	5					
410047	TARCUITA CREEK AT OLD BORAMROLA	7/05/1938 LUCT	Level Flow Conductivity Temperature	32	50	15	24			27	29	27	7	11	4	5					

Figure 42 - Murrumbidgee (410) Current gauging stations 2 of 3

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum of interested parties (1-5)					Flow regime importance where applicable				Interested parties above					Importance			
				Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO			
410048	KYAMBA CREEK AT LADYSMITH	10/05/1938 LUCT	Level Flow Conductivity Temperature	24	39	10	10			22	24	24	5	9	2	2					
410050	MURRUMBIDGE RIVER AT BILLUNDR	12/01/1919 LUCT	Level Flow Cond Temp Turbidity	27	42	14	14			25	25	23	6	9	3	3					
410057	GOGARRAGANDORA RIVER AT LACMALAC	16/12/1944 LUCTR	Level Flow Conductivity Temp Rain	31	50	15	24	17		27	29	27	7	11	4	5	4				
410058	TARCUITA CREEK AT WESTBOOK	30/05/1946 LF	Level Flow	18	33					20	20	20	4	8							
410059	GILMORE CREEK AT GILMORE	16/01/1994 LF	Level Flow	21	37					25	25	23	5	8							
410061	ADJONG CREEK AT BATTLE COW ROAD	10/09/1947 LUCT	Level Flow Conductivity Temperature	27	45	14	18			27	29	27	6	10	3	4					
410062	NUMERALLA RIVER AT NUMERALLA SCHOOL	5/11/1947 LF	Level Flow	21	31					20	20	17	5	7							
410068	MURRUMBIDGE RIVER AT GLENDALE	15/01/1954 LUCT	Level Flow Conductivity Temperature	23	29	9	14			15	15	20	5	7	2	3					
410070	BOMBORLE CREEK AT BOMBORLE	4/05/1958 GQ	Gaugings and Ratings	12	15					6	9	8	3	6			2				
410071	TUMUT RIVER AT ODDIS BRIDGE	12/03/1954 LVFCT	Level Velocity Flow Cond and Temp	32	44			28		22	24	24	7	10			6				
410076	STRIKE-A-LIGHT CREEK AT JERANGLE ROAD	17/08/1954 LF	Level Flow	21	30					15	19	17	5	7							
410081	CODMA CREEK AT CODMA NO.2 (THE GRANGE)	6/12/1955 LUCT	Level Flow Cond Temp Turbidity	12	15	9	9			9	13	13	5	7	2	2					
410085	GOODRADIGBEE RIVER AT BRINDABELLA (NO.25NO.3-CABBAT)	4/10/1917 LF	Level Flow	11	13					11	13	14	5	7							
410090	YASS RIVER AT GUNDAROO	22/09/1917 LUCT	Level Flow Conductivity Temperature	21	24	9	9			11	13	14	5	7	2	2					
410091	BILLABONG CREEK AT WALBUNDRIE	16/06/1965 LUCT	Level Flow Conductivity Temperature	40	55	19	24			30	32	33	9	12	5	5					
410092	CUNNINGHAM CREEK AT NEAR HADDEN	26/06/1965 LF	Level Flow	7	9					5	4	4	6	8	3	3					
410093	OLD MAN CREEK AT KYWONG (TORPES)	21/07/1965 LUCT	Level Flow Conductivity Temperature	20	25	12	12			20	20	18	6	8	3	3					
410097	BILLABONG CREEK AT ABERFELDY	23/11/1967 LUCT	Level Flow Conductivity Temperature	20	29	14	14			19	18	16	5	7	3	3					
410101	HOLLAHANE CREEK AT DOONSIDIE	24/06/1968 LUCT	Level Flow Conductivity Temperature	26	36	14	14			17	23	20	6	9	3	3					
410109	FOREST CREEK AT OFFTAKE	3/02/1994 LVFT	Level Velocity Flow and Temperature	19	29			9		18	18	16	4	7			2				
410106	GILMORE CREEK AT WYALENA	24/03/1972 LF	Level Flow	14	25					13	13	13	3	6							
410107	MOUNTAIN CREEK AT MOUNTAIN CREEK	19/05/1972 LF	Level Flow	14	18					6	8	10	3	4							
410108	DRAINAGE CANAL 800 AT OUTFALL	1/07/1969 LUCT	Level Flow Conductivity Temperature	18	28			9		12	14	13	4	7	2	2					
4101010	BILLABONG CREEK AT WANGANELLA	16/11/1999 LF	Level Flow	22	37					24	26	26	5	9							
4101085	UMBANGO CREEK AT HUMULA ROAD BRIDGE	29/04/1988 GQ	Gaugings and Ratings	12	7					5	4	4	5	2							
4101089	TUMUT RIVER AT MURRUMBIDGE JUNCTION	12/12/2001 T	Temperature					9		0	0	0					2				
4101090	INLET CHANNEL AT UPSTREAM TOMBULLEN STORAGE	2/09/2003 LVF	Level Velocity Flow	22	30					20	20	19	5	7							
410110	DRAINAGE CANAL 500 AT OUTFALL	4/07/1969 LUCT	Level Flow Conductivity Temperature	17	27	9	9			7	9	11	4	7	2	2					
410112	JINDALEE CREEK AT JINDALEE	16/08/1975 LFR	Level Flow Rainfall	12	15			10		6	9	8	3	6			2				
410114	KILMUCK CREEK AT WYANGLE	28/05/1975 LFR	Level Flow Rainfall	21	33			19		17	23	21	5	8			4				
410130	MURRUMBIDGE RIVER AT DOWNSTREAM BALKANALD WEIR	28/02/1979 LUCTO	Level Flow EC DO	42	57	17	27		26	39	39	39	9	13	5	6		6			
410133	COLLEMBALLY CREEK AT NEAR BUNDY	25/02/1991 LUCT	Level Flow Conductivity Temperature	23	30	14	14			13	12	12	5	7	3	3					
410134	BILLABONG CREEK AT DANLOT	24/04/1994 LUCT	Level Flow Cond Temp Turbidity	42	60	18	27			30	32	33	9	13	5	6					
410136	MURRUMBIDGE RIVER AT DOWNSTREAM HAY WEIR	1/07/1979 LF	Level Flow	38	49					27	29	29	8	11							
410137	BEAVERS CREEK AT MOUNDOEY	20/10/1912 LFR	Level Flow Rainfall	17	11			18		20	20	18	4	7				4			
410141	MICALISO CREEK AT MICHALISO	25/06/1954 LUCT	Level Flow Cond Temp Turbidity	9	14	9	9			6	9	8	6	2	2	2					
410148	FOREST CREEK AT WARRINGTON WEIR	1/09/1980 LUCT	Level Flow Conductivity Temperature	29	41	14	14			21	25	24	6	9	3	3		4			
410152	STORY CREEK AT EDWARDSBORO	11/04/1984 LF	Level Flow	9	18					8	9	10	10	10							
410155	TARCUITA CREEK AT BELMORE BRIDGE	20/02/1985 LR	Rain Rainfall					15		8	9						3				
410156	KYAMBA CREEK AT BOOK BOOK	19/02/1985 LUCTR	Level Flow Conductivity Temp Rain	22	30	15	15	19		15	19	17	5	9			1				
410160	WILLIS CREEK AT WHITE HILL	12/06/1988 LF	Level Flow Rainfall	17	17			5		7	7	7	7	7							
410168	BILLABONG CREEK AT DOWNSTREAM HARTWOOD WEIR	21/09/1995 LUCT	Level Flow Conductivity Temperature	30	46	16	16			29	31	29	7	11	4	4		1			
410169	YANCO CREEK AT YANCO BRIDGE	7/09/1995 LUCT	Level Flow Conductivity Temperature	41	54	18	23			30	32	30	9	12	5	5					
410170	BILLABONG CREEK AT UPSTREAM JONES BRIDGE	21/02/1995 LUCT	Level Flow Conductivity Temperature	24	38	10	10			21	23	23	5	9	2	2					
410178	YASS RIVER AT JUBA RIVER (SIX DAM REVIEW/REVIEW)	12/02/1999 LUCT	Level Flow Conductivity Temperature	29	42	16	16			28	30	30	7	10	4	4					

Potential Upgrades

Figure 45 - Murrumbidgee (410) potential upgrade sites

Basin- Site ID	Location	Current Monitoring (July 2020)	Request type (flow and storage levels)	Request reason - Summary	Request Status
410087	Murrumbidgee - BULLENBUNG CREEK AT ABOVE OLD MAN CREEK	None - Discontinued	Flow	For environmental water planning and event management in Old Man Creek (near Narrandera)	Proposed - Subject to further client consultation and review
410143	Murrumbidgee - MURRUMBIDGEE RIVER AT ERINGOARRAH	Level	Flow	To better monitor Murrumbidgee flows and inflows between Gundagai and Wagga Wagga	Proposed - Subject to further client consultation and review
410155	Murrumbidgee - TARCUTTA CREEK AT BELMORE BRIDGE	Level Rainfall	Flow, Rain	For environmental water planning and event management in Tarcutta Creek (upstream Wagga Wagga)	Proposed - Subject to further client consultation and review
41099999	Billabong Creek significantly d/s of Darlot		Flow	For Compliance and Water Accounting (not near Darlot)	Proposed - Subject to further client consultation and review
41099999	Murrumbidgee Waldira		Flow	For Compliance and Water Accounting (d/s Balranald)	Proposed - Subject to further client consultation and review

Potential Downgrades

Figure 46 - Murrumbidgee (410) potential downgrade sites

STATION #	STNAME	COMMENCE	CURRENT PARAMETERS
410160	WILLIAMS CREEK AT WHITE HILL	22/06/1988	Level Flow Rainfall
410187	TEN MILE CREEK AT HOLBROOK NO.3	29/08/2001	Level Flow
41000200	NIMBO CREEK AT DOWNSTREAM OFFTAKE	29/10/1991	Level Flow
41000208	MOLONGLO RIVER AT KOBADA	17/06/2004	Level Flow
410851	YASS RIVER AT ABOVE MACKS REEF ROAD	20/02/1976	Level Flow
410112	JINDALEE CREEK AT JINDALEE	19/08/1975	Level Flow Rainfall
410107	MOUNTAIN CREEK AT MOUNTAIN CREEK	19/05/1972	Level Flow
410152	STONY CREEK AT EDWARDSTOWN	13/04/1984	Level Flow
410088	GOODRADIGBEE RIVER AT BRINDABELLA (NO.2&NO.3-CABBANS)	4/10/1937	Level Flow
410199	TUMUT RIVER AT U/S NIMBO OFFTAKE	29/04/1977	Level Flow
41000210	COLOMBO CREEK AT COONONG WEIR	1/08/2006	Level Flow
41000269	BRUNGLE CREEK AT RED HILL NO.2	9/05/2012	Level Flow Rainfall
41000254	JUGIONG CREEK AT CUMBAMURRA NO.2	3/02/2011	Level Flow

Potential Upgrades

Nil

Potential Downgrades

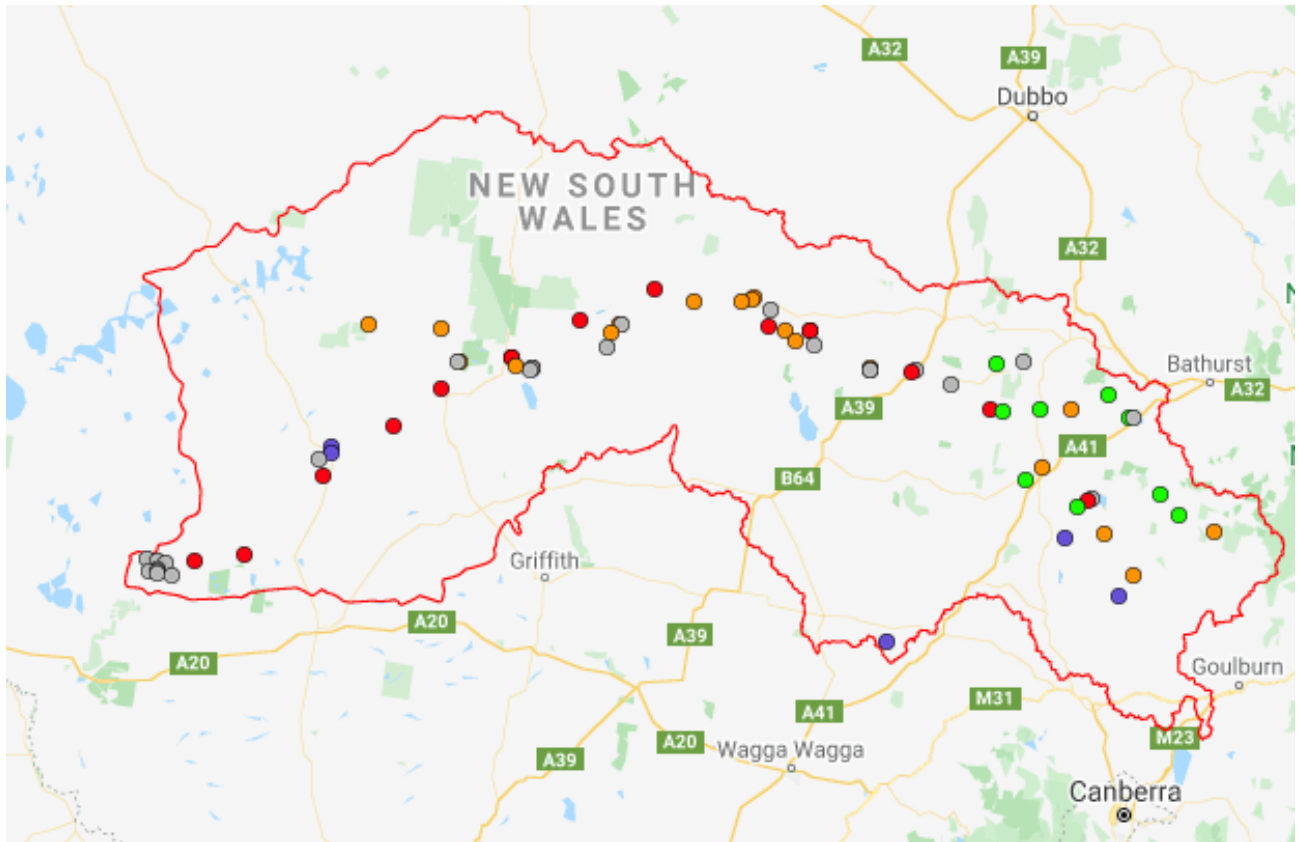
Figure 50 - Lake George (411) potential downgrade sites

STATION #	STNAME	COMMENCE	CURRENT PARAMETERS
411003	BUTMAROO CREEK AT BUTMAROO	28/09/1971	Level Flow

Lachlan (412)

Telemetry Sites

Figure 51 - Lachlan (412) showing telemetered gauging stations - Source WaterNSW website



Current gauging stations

Figure 54 - Lachlan (412) current gauging stations 1of 2

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum of interested parties (1-5s)						Flow regime importance where applicable			Interested parties above						Importance	
				Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO		
412002	LACHLAN RIVER AT COWRA	14/12/1892 LFCT	Level Flow Conductivity Temperature	34	44	15	20			19	24	25	6	8	4	4				
41200208	CROWTHER CREEK AT WATERVALE	24/03/2011 LFCT	Level Flow Conductivity Temperature	14	22	10	10			5	5	4	3	5	2	2				
41200209	ABERCOMBE RIVER AT ABERCOMBE NO.2	1/06/2011 LFCT	Level Flow Conductivity Temp Rain	30	41	15	20	13		18	19	19	7	9	4	4			3	
41200220	COOKSVALE CREEK AT UPPER MONTANA	1/06/2011 LF	Level Flow	7	34					5	4	4	2	4						
412004	LACHLAN RIVER AT FORBES (COTTONS WEIR)	5/12/1939 LFCT	Level Flow Conductivity Temperature	42	51	15	24			24	29	29	8	10	5	5				
412005	LACHLAN RIVER AT BOOISGAL	14/03/1891 LFCT	Level Flow Conductivity Temperature	17	51	18	27			27	29	29	8	11	6	6				
412008	LACHLAN RIVER AT CONDOBOLIN BRIDGE	21/12/1891 LFCT	Level Flow Conductivity Temperature	34	45	15	25			17	24	24	6	9	4	5				
412008	LAKE CREEK AT LAKE CARGELLIGO OUTLET	22/01/1906 GQ	Gaugings and Ratings	33	44					16	18	18	7	7						
412012	LACHLAN RIVER AT LAKE CARGELLIGO WEIR	22/06/1902 LF	Level Flow	33	44					22	24	24	7	10						
412012	WILLANDRA CREEK AT ROAD BRIDGE	4/03/1912 LF	Level Flow	19	29					16	18	18	4	7						
412014	GOOBANG CREEK AT CONDOBOLIN	23/11/1916 LF	Level Flow	17	28					14	14	14	4	7						
412015	WALLAMUNDY CREEK AT OFFTAKE ISLAND CREEK	31/07/1935 LF	Level Flow	19	26					15	15	14	4	6						
412017	BUMBOGGAN CREEK AT OFFTAKE	16/03/1917 GQ	Gaugings and Ratings	29	39					17	19	19	7	10						
412023	ISLAND CREEK AT FAIRHOLME	8/03/1927 LF	Level Flow	14	23					12	12	12	3	6						
412024	LACHLAN RIVER AT MUGGUTHURIE	19/03/1928 LF	Level Flow	14	19					10	10	10	3	5						
412027	LACHLAN RIVER AT REDS FLAT	3/12/1930 LFCT	Level Flow Conductivity Temperature	27	37	20	25			15	15	13	6	8	5	5				
412029	BOOROWA RIVER AT PROSSERS CROSSING	18/03/1938 LFCT	Level Flow Conductivity Temp Rain	42	50	20	25	13		22	24	22	9	11	5	5	3			
412030	MANDAGERY CREEK UPSTREAM EUGOWRA (SMITHFIELD)	31/03/1938 LFCT	Level Flow Conductivity Temperature	32	44	20	20			25	27	26	7	10	4	4				
412033	BEUBULA RIVER AT HELENDOME	26/03/1938 LF	Level Flow	38	49					32	34	29	8	11						
412036	LACHLAN RIVER D/S JEMALONG WEIR	22/10/1940 GQ	Gaugings and Ratings	38	40					21	28	27	8	9						
412038	LACHLAN RIVER U/S WILLANDRA WEIR	30/11/1890 LFCT	Level Flow Conductivity Temperature	37	50	18	27			27	29	28	8	11	5	6				
412039	LACHLAN RIVER AT HILLSTON	19/03/1941 LF	Level Flow	38	50					22	29	28	7	10						
412043	WILLANDRA CREEK AT WILLANDRA HOMESTEAD	17/09/1948 LF	Level Flow	18	26					16	18	17	4	7						
412045	LACHLAN RIVER AT CORROONG	10/03/1952 LF	Level Flow	32	44					22	24	24	7	10						
412046	WALLAROI CREEK UPSTREAM WORKONGORRA WEIR	12/12/1916 LF	Level Flow	18	25					15	15	14	4	6						
412047	BENSONS DROP WEIR DOWNSTREAM LAKE BREWSTER OUTLET	26/03/1944 LF	Level Flow	27	35					20	20	19	6	8						
412048	LACHLAN RIVER AT LAKE BREWSTER WEIR	15/04/1950 GQ	Gaugings and Ratings	27	35					15	15	15	6	8						
412050	CROOKWELL RIVER AT NARRAWA NORTH	21/03/1955 LF	Level Flow	19	29					19	18	16	5	7						
412056	BEUBULA RIVER AT THE NEEDLES	8/02/1957 LF	Level Flow	27	36					25	25	25	6	8						
412057	LACHLAN RIVER AT NANAMAI	19/07/1958 LF	Level Flow	28	39					17	24	24	5	8						
412063	LACHLAN RIVER AT NARRAWA	9/06/1960 LFR	Level Flow Rainfall	17	25			10		13	13	13	4	6					2	
412066	ABERCOMBE RIVER AT HOLLEY NO.2	20/06/1960 LF	Level Flow	17	24					13	13	13	4	6						
412067	LACHLAN RIVER DOWNSTREAM WYANGALA DAM	3/12/1968 LFCT	Level Flow Conductivity Temperature	36	51	18	23			29	29	29	8	11	5	5				
412077	BEUBULA RIVER AT CARCOAR	9/12/1968 LFCT	Level Flow Conductivity Temp Rain	30	43	18	18			30	32	27	7	10	4	4				
412078	LACHLAN RIVER AT WHEALBAH	17/03/1968 LF	Level Flow	19	31					17	19	19	4	7						
412080	ELTERS CREEK AT BENEKE	13/04/1968 LF	Level Flow	27	35					25	27	23	6	9						
412100	JEMALONG MAIN CANAL AT OFFTAKE	7/07/1953 GQ	Gaugings and Ratings	24	33					13	13	13	6	8						
412101	LAKE CARGELLIGO INTAKE UPSTREAM LAKE CARGELLIGO WEIR	9/07/1933 LFT	Level Flow Temperature	17	24			9		15	15	15	4	5			2			
412102	LAKE BREWSTER INTAKE DOWNSTREAM LB WEIR POOL REGULA	5/26/1961 GQ	Gaugings and Ratings	25	35					15	17	16	7	10						
412109	LACHLAN RIVER CONDUIT DOWNSTREAM REGULATOR	29/03/1968 GQ	Gaugings and Ratings	30	43					17	19	18	7	10						
412112	MERRIMAEL CREEK AT COBB HIGHWAY	14/08/1966 LF	Level Flow	17	29					17	19	19	4	7						
412124	MUGBAGAN CREEK AT COBB HIGHWAY	14/08/1966 LF	Level Flow	17	29					17	19	19	4	7						
412134	WATTLIE CREEK AT DUDGEMAN	20/03/1988 LFR	Level Flow Rainfall	10	16			10		8	7	7	3	5					2	
412135	MANDAGERY CREEK AT GLENAYR	28/02/1992 LR	Level Rainfall	13				10			3	3		4					2	

Figure 55 - Lachlan (412) current gauging stations 2 of 2

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum of interested parties (1-5s)						Flow regime importance where applicable			Interested parties above						Importance	
				Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO		
412183	MERROWIE CREEK DOWNSTREAM OF OFFTAKE WEIR	24/07/1996 LF	Level Flow	17	28					17	19	18	4	7						
412175	HOVELLS CREEK AT HOVELLS CREEK NO.2	24/03/2011 LFCT	Level Flow Conductivity Temperature	24	34	18	18			20	20	19	6	8	5	4				
412177	CUMBUNG SWAMP AT LAKE BUNIMBURT INFLOW	22/06/2006 LVF	Level Velocity Flow	15	21					15	15	14	4	5						
412179	LAKE MAROOL OUTFLOW CHANNEL	14/08/2001 LVF	Level Velocity Flow	11	20					15	14	14	3	5						
412187	WILLANDRA CREEK AT YULGA	12/02/2002 LF	Level Flow	14	24					15	15	14	4	6						
412188	NERATHONG CREEK AT NERATHONG	4/04/2002 LF	Level Flow	20	30					20	20	19	5	7						
412189	BOOBORO CREEK AT OFFTAKE NO.2	18/11/2004 LF	Level Flow	20	32					22	24	24	5	8						
412190	WALLAROI CREEK AT WALLAMUNDY CREEK OFFTAKE	9/02/2006 LF	Level Flow	22	26					20	20	19	5	6						
412193	BOOBORO CREEK AT RETURN (CANNONS BRIDGE)	14/07/2005 LF	Level Flow	22	33					22	24	23	6	8						
412194	LACHLAN RIVER AT FOUR MILE WEIR	30/05/2006 LFCT	Level Flow Conductivity Temperature	26	34	15	15			20	20	19	6	8	3	3				
412195	BEUBULA RIVER AT LYNDON (UPSTREAM CANOWINDRA)	10/04/2008 LFCT	Level Flow Conductivity Temperature	41	49	15	20			28	33	33	8	10	4	4				
412196	MANNA CREEK AT DOWNSTREAM DRIFTWAY ROAD	1/07/2016 GQ	Gaugings and Ratings		15					11	11	13		4						

Current storages

Figure 56 - Lachlan Current storages

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO
412010	WYANGALA DAM AT STORAGE GAUGE	30/06/1955 L	Level Volume Rain	24	45			10		25	25	25	6	10				2
412048	LACHLAN RIVER AT LAKE BREWSTER WEIR	15/04/1950 GQ	Level Discharge Volume	27	39					15	15	15	6	9				
412106	BEUBULA RIVER AT CARCOAR DAM STORAGE GAUGE	24/11/1970 L	Level Volume Rain	25	44			10		20	20	20	6	10				2
412107	LAKE CARGELLIGO AT STORAGE GAUGE	7/01/1963 L	Level Volume Rain	22	41			5		15	15	15	5	9				1
412108	LAKE BREWSTER AT STORAGE GAUGE	7/01/1963 L	Level Volume Rain	22	40			5		15	15	15	5	9				1
412172	LACHLAN RIVER AT JEMALONG WEIR - STORAGE GAUGE	L	Level Volume	22	38					15	15	15	4	9				

Potential Upgrades

Figure 57 - Lachlan (412) potential upgrade sites

Basin- Site ID	Location	Current Monitoring (July 2020)	Request type (flow and storage levels)	Request reason - Summary	Request Status
412102	Lachlan - LAKE BREWSTER INTAKE	Gaugings and Ratings	Flow	For environmental water planning and event management in Lachlan River (between Lake Cargelligo and Hillston)	Proposed - Subject to further client consultation and review
412179	Lachlan - LAKE MAROOL OUTFLOW CHANNEL	Level Velocity Flow	Flow	Environmental water planning and event management, compliance, accounting in the Lachlan	Proposed - Subject to further client consultation and review
412180	Lachlan - Toopuntul channel	Level	Flow	Environmental water planning and event management, compliance, accounting in the Lachlan	Proposed - Subject to further client consultation and review
412181	Lachlan - SW Floodplain wetspot	Level	Flow	Environmental water planning and event management, compliance, accounting in the Lachlan	Proposed - Subject to further client consultation and review
412183	Lachlan - The Woodcutters	Level	Flow	Environmental water planning and event management, compliance, accounting in the Lachlan	Proposed - Subject to further client consultation and review
41299999	Lachlan - Box Creek offtake from Merrowie Creek		Flow, Temp	To monitor delivery of environmental water	Proposed - Subject to further client consultation and review
41299999	Lake Forbes			New site	Proposed - Subject to further client consultation and review

Potential Downgrades

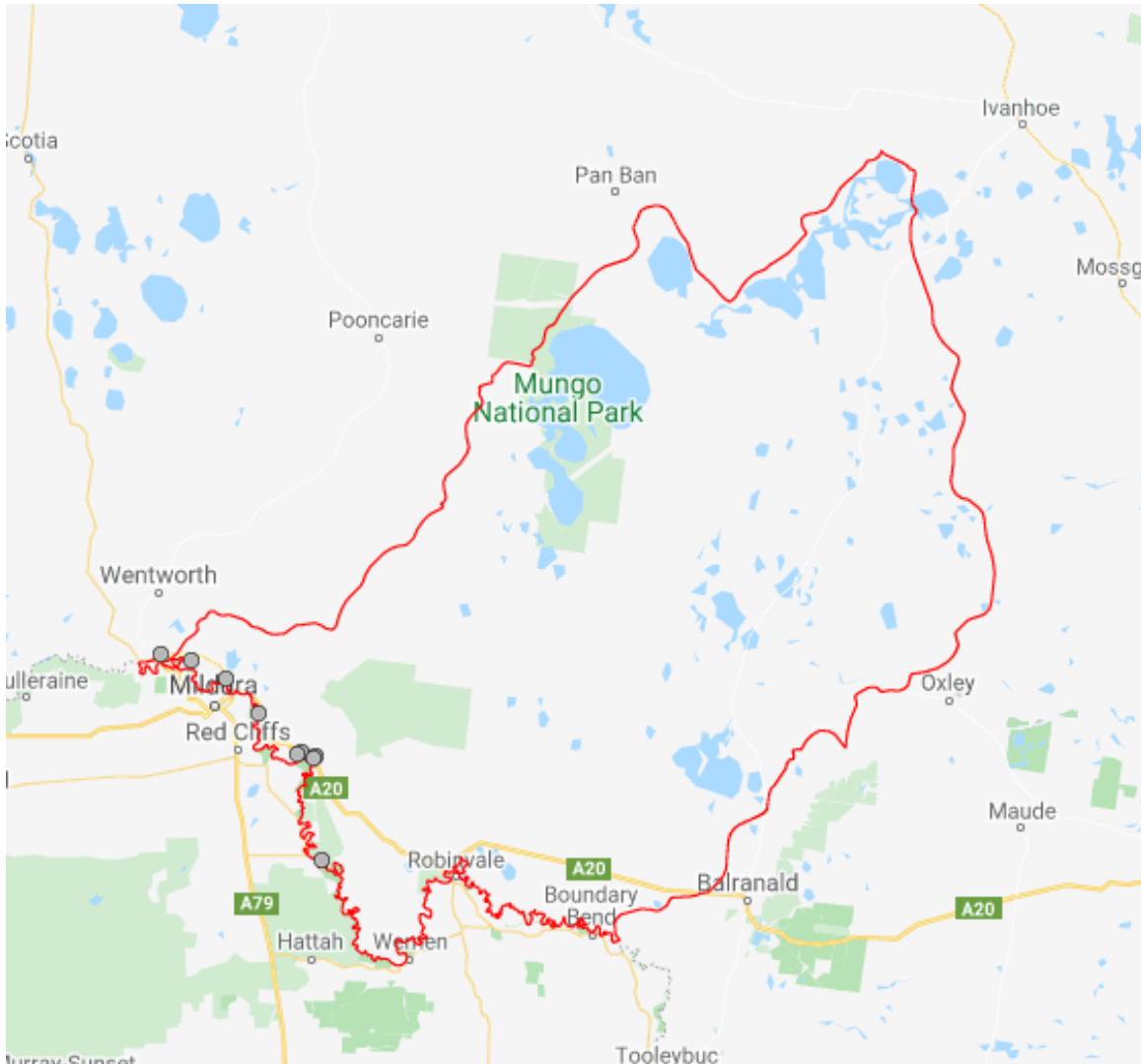
Figure 58 - Lachlan (412) potential downgrade sites

STATION #	STNAME	COMMENCE	CURRENT PARAMETERS
412198	MANNA CREEK AT DOWNSTREAM DRIFTWAY ROAD	1/07/2016	Gaugings and Ratings
412024	LACHLAN RIVER AT MULGUTHERIE	19/01/1926	Level Flow
412179	LAKE MAROOL OUTFLOW CHANNEL	14/08/2001	Level Velocity Flow
412066	ABERCROMBIE RIVER AT HADLEY NO.2	20/06/1960	Level Flow
412177	CUMBUNG SWAMP AT LAKE BUNUMBURT INFLOW	22/06/2006	Level Velocity Flow
412046	WALLAROI CREEK UPSTREAM WORRONGORRA WEIR	12/12/1916	Level Flow

Benanee (413)

Telemetry Sites

Figure 59 - NSW extent of Benanee (413) showing telemetered gauging stations - Source WaterNSW website



Data Inventory

Figure 60 - Data Inventory Benanee (413) - Source WaterNSW website

SURFACE WATER Archive Data Inventory for 413-Benanee River Basin														
S=Telemetered **Storage														
Station ID	FLOWS		HEIGHTS		RATINGS		No. No.		R A W C T	W H O	Discont.	Org. Net	Code Class	NAME
	Start	End	Start	End	First Starts	Last Starts	Last Tab	of of	a t t o u	i u x				
							Tab	Tab	n p	p d b	H d d g			
\$413001									18	T C		DWR	WQR	MURRAY @ MCLIFFS1
\$413002			25/04/1997	03/06/2020	01/01/1900	01/01/1900	1	1	22	T C		DWR	WQR	MURRAY @ MCLIFFS2
\$41310022										T C		DWR	WQR	COLIGNAN PONTOON
\$41310023										T C		DWR	WQR	MCLIFFS U/S PONTOON
\$41310024										T C	O	DWR	WQR	MCLIFFS D/S PONTOON
\$41310025										T C		DWR	WQR	REDCLIFFS PONTOON
\$41310026										T C		DWR	WQR	CHAFFEYS PONTOON
\$41310027										T C		DWR	WQR	MERBEIN PONTOON
\$41310028										T C		DWR	WQR	CURLWAA PONTOON

Current gauging stations

Figure 61 - Benanee (413) current gauging stations

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum of interested parties (1-5s)						Flow regime importance where applicable			Interested parties above					
				Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO
413001	MURRAY RIVER AT MALLEE CLIFFS NO.1 DOWNSTREAM	4/11/1992 CT	Conductivity and Temperature				10	12				0				2	3	
413002	MURRAY RIVER AT MALLEE CLIFFS NO.2 UPSTREAM	4/11/1992 LCT	Level Conductivity and Temperature	14			10	12				5	3			2	3	
413004	MURRAY RIVER AT COWANNA BEND	10/12/2004 MF	Manual Readings Flow		9					0	0	0			2			
41310022	MURRAY RIVER AT COLIGNAN PONTOON	7/07/2006 CT	Conductivity and Temperature				10	15				0				3	3	
41310023	MURRAY RIVER AT MALLEE CLIFFS UPSTREAM PONTOON	7/07/2006 CT	Conductivity and Temperature				12	10				0				3	2	
41310024	MURRAY RIVER AT MALLEE CLIFFS DOWNSTREAM PONTOON	7/07/2006 CT	Conductivity and Temperature				12	10				0				3	2	
41310025	MURRAY RIVER AT REDCLIFFS PONTOON	7/07/2006 CT	Conductivity and Temperature				11	10				0				3	2	
41310026	MURRAY RIVER AT CHAFFEYS GRAVEYARD PONTOON	7/07/2006 CT	Conductivity and Temperature				12	10				0				3	2	
41310027	MURRAY RIVER AT MERBEIN PONTOON	7/07/2006 CT	Conductivity and Temperature				12	10				0				3	2	
41310028	MURRAY RIVER AT CURLWAA PONTOON	7/07/2006 CT	Conductivity and Temperature				17	15				0				4	3	

Current storages

Nil

Potential Upgrades

Nil

Potential Downgrades

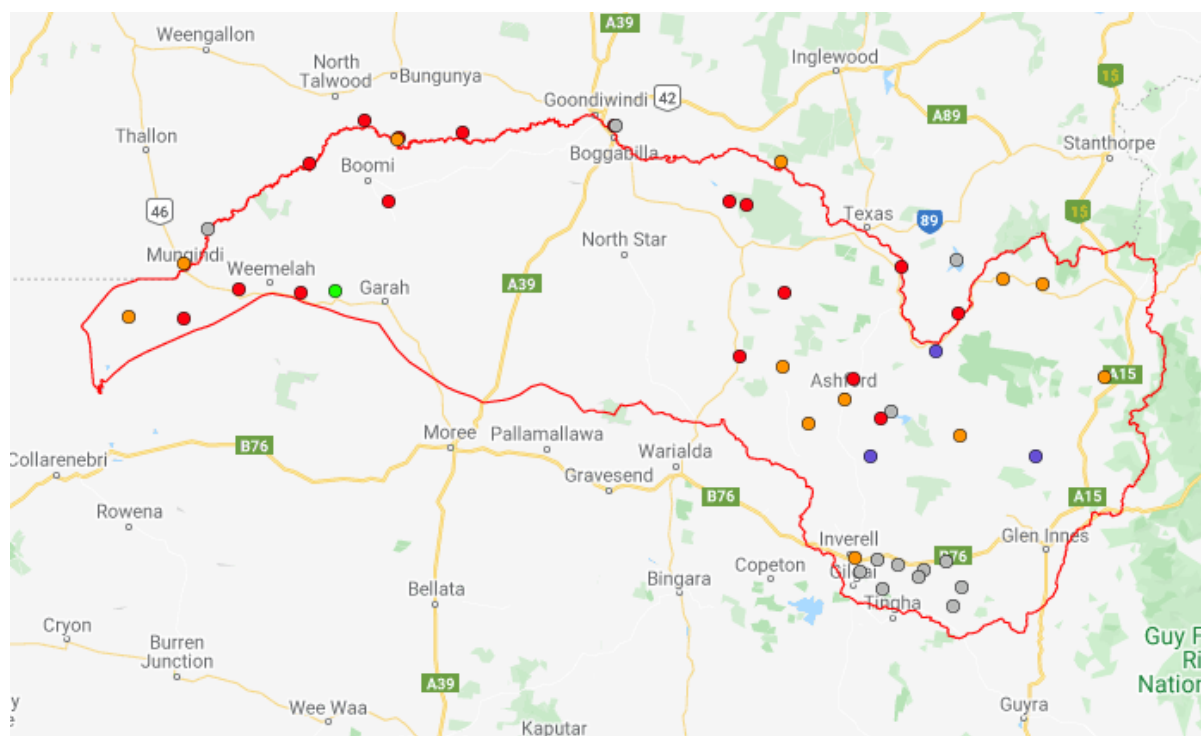
Figure 62 - Benanee (413) potential downgrade sites

STATION #	STNAME	COMMENCE	CURRENT PARAMETERS
413004	MURRAY RIVER AT COWANNA BEND	10/12/2004	Manual Readings Flow

Macintyre (416)

Telemetry Sites

Figure 63 - Macintyre (416) showing telemetered gauging stations - Source WaterNSW website



Data Inventory

Figure 64- Data Inventory Macintyre (416) gauging stations - Source WaterNSW website

SURFACE WATER Archive Data Inventory for 416-Macintyre River Basin														
*Telemetered **Storage														
Station ID	FLOWS		HEIGHTS		RATINGS		No. of Last of Tab	No. of Tab	at t m p n s y Date i x x b b h d d g	Discont.	Org. Net Code	WHO Class	NAME	
	Start	End	Start	End	First Starts	Last Starts								
416001	01/01/1989	01/01/2019	01/02/1990	25/02/2020	01/12/1989	19/09/2018	170	49	598	T	C	DWR	SFF	BARROW R @ MUNGINDI
416002	01/01/1989	01/07/2017	01/01/1986	25/06/2020	01/10/1984	03/04/2017	154	66	608	T		DWR	SFF	MACINTYRE BOGGABILLA
416003	01/01/1901	01/01/2101	01/09/1921	23/06/2020	01/09/1921	01/07/2019	149	29	597			DWR	PI	TENTERFIELD CLIFTON
416006	01/01/1901	01/01/2101	10/09/1970	18/06/2020	22/11/1933	18/11/2019	271	57	622			DWR	SFF	SEVERN @ ASHFORD
416007	01/01/1901	01/01/2101	20/09/1972	24/06/2020	09/08/1934	01/09/2019	229	72	608			DWR	SFF	DUMARESQ @ BUSHMAN
416008	01/01/1901	01/01/2101	25/06/1970	23/06/2020	10/08/1934	01/07/2019	322	63	509	R		DWR	SFF	SEVERN @ BUSHMAN
416010	01/01/1901	01/01/2101	01/04/1980	18/06/2020	20/12/1936	28/12/2004	259	56	535			DWR	PI	MACINTYRE MALLANGRA
416011	01/01/1901	01/01/2101	14/06/1972	23/06/2020	01/03/1937	01/09/2019	301	73	612			DWR	SFF	DUMARESQ @ ROSEMEATH
416012	01/01/1901	01/01/2101	18/10/1972	24/06/2020	13/12/1969	30/11/2008	219	37	517	T	C	DWR	SFF	MACINTYRE @ HOLDFAST
416016	01/01/1901	01/01/2101	18/07/1971	16/06/2020	09/02/1965	14/07/2012	200	29	409	R	T	DWR	SFF	MACINTYRE INVERELL
416020	01/01/1901	01/01/2101	09/11/1978	18/06/2020	11/07/1978	05/07/2016	245	62	305	R		DWR	PI	OTTELIERS @ COOLADAI
416021	01/01/1967	01/01/2017	20/07/1971	04/10/2019	18/07/1971	30/05/2002	398	61	196	R		DWR	SMS	FRAIERS @ WESTHOLME
416022	01/01/1967	01/01/2017	06/03/1978	19/02/2020	01/03/1967	19/03/2017	208	44	289			DWR	SFF	SEVERN @ FLADSBURY
416023	01/01/1967	01/01/2017	07/03/1978	22/06/2020	10/03/1967	11/12/2014	167	33	326	R		DWR	PI	DESWATER @ BOLIVIA
416027	01/01/1968	01/01/2017	25/07/1979	15/04/2020	30/03/1968	14/03/2020	152	28	325			DWR	SFF	GIL GIL @ WEEMELAH
416030	*		01/01/1969	21/07/2020	01/01/1900	01/01/1900	100	1		R	T	DWR	SFF	PINDARI DAM
416031	01/01/1997	01/01/2017	29/09/1970	12/09/2019	26/10/1978	28/03/2014	108	10	128	R		DWR	PRF	MACINTYRE RIDGELANDS
416032	01/01/1901	01/01/2101	10/07/1969	23/06/2020	01/03/1969	14/02/2020	235	48	326	R		DWR	SFF	MOLE @ DONALDSON
416037	01/01/1901	01/01/2101	06/07/1976	26/06/2020	01/07/1976	08/04/2017	251	43	243	R		DWR	SFF	BOOMI @ OPTAKE
416039	01/01/1974	01/01/2017	09/05/1974	22/06/2020	08/05/1974	22/08/2007	199	32	284	T	C	DWR	SFF	SEVERN @ STRATHBOSSIE
416040	01/01/1901	01/01/2101	05/06/1996	25/06/2020	01/01/1900	24/08/2016	13	15	156	R	T	DWR	SFF	DUMARESQ @ GLENARBO
416043	01/01/1901	01/01/2101	06/07/1976	26/06/2020	01/07/1976	21/01/2011	123	22	231			DWR	SFF	MACINTYRE BOOMI WEIR
416046	01/01/2011	01/01/2017	24/08/2011	25/06/2020	15/01/1981	06/01/2015	104	8	85			DWR	CR	MACINTYRE BOOMI WEIR
416047	01/01/1901	01/01/2101	18/01/1985	25/06/2020	01/10/1984	01/02/2013	116	17	170			DWR	SFF	MACINTYRE @ YERREMAN
416048	01/01/1901	01/01/2101	13/01/1988	26/06/2020	07/11/1984	25/06/2010	105	5	178			DWR	SFF	MACINTYRE @ MANOMNA
416050	01/01/1987	01/01/2017	08/10/1987	15/04/2020	01/01/1900	16/04/2017	48	14	163			DWR	SFF	BARROW U/S PRESBYTER
416052	01/01/1987	01/01/2017	02/06/1987	10/12/2019	02/06/1987	21/02/2020	123	19	181			DWR	SFF	GIL GIL @ GALLOWAY
416054	01/01/1996	01/01/2017	05/12/1996	26/02/2020	05/12/1996	12/03/2020	14	14	134			DWR	SFF	GIL GIL @ BOLLARABOO
416055			19/12/1996	07/02/2020	01/01/1900	01/01/1900	1	1	19	R		DWR	PRF	MIDDLE CR @ FERNDALE
416056			31/12/1996	29/11/2019	01/01/1900	01/01/1900	1	1	19	R		DWR	PRF	MACINTYRE@LITTLE VLY
416057			09/01/1997	23/04/2020	01/01/1900	01/01/1900	1	1	19	R		DWR	PRF	MACINTYRE@BELMORE BR
416058	01/01/1997	01/01/2017	09/01/1998	15/08/2020	01/03/1997	07/11/2015	15	15	52	R		DWR	PRF	MACINTYRE @ YERREMAN
416059			26/03/1997	23/04/2020	01/01/1900	01/01/1900	1	1	18	R		DWR	PRF	KINGS CREEK @ GRED
416061			25/06/1998	22/11/2019	01/01/1900	01/01/1900	1	1	18	R		DWR	PRF	PARADISE @ PARADISE
416062			22/06/1998	23/04/2020	01/01/1900	01/01/1900	1	1	19	R		DWR	PRF	KINGS @ NEWSTEAD NTH
416063			24/06/1998	23/04/2020	01/01/1900	01/01/1900	1	1	20	R		DWR	PRF	MACINTYRE @ WYOMING
416064			26/06/1998	22/11/2019	01/01/1900	01/01/1900	1	1	16	R		DWR	PRF	MIDDLE CR @ STANNIFE
416065			22/06/2000	22/11/2019	01/01/1900	01/01/1900	1	1	18	R		DWR	DISC	BOGGABILLA W. STORAGE
416066			22/06/2000	22/11/2019	01/01/1900	01/01/1900	1	1	18	R		DWR	PRF	MACINTYRE@RIVERSTONE
416067	01/01/2002	01/01/2017	21/03/2002	26/02/2020	20/03/2002	05/09/2019	12	12	135	T		DWR	SFF	SEVERN @ DUCCA HARRI
416068	01/01/2002	01/01/2016	11/07/2002	07/05/2020	11/07/2002	31/03/2017	6	6	36	R		DWR	PRF	MACINTYRE @ TINTOT
416069	01/01/2002	01/01/2017	30/05/2002	04/10/2019	30/05/2002	05/04/2015	3	3	20	R		DWR	PRF	FRAIERS @ GLENKIRCH
416072	01/01/2014	01/01/2017	25/08/2011	26/06/2020	17/01/2013	17/01/2013	1	1	50			DWR	FUJ	WHALAN @ EUBANK
416080	01/01/2012	01/01/2013	16/08/2012	15/04/2020	14/08/2012	17/02/2020	6	6	55			DWR	SFF	GIL GIL @ M'VILLE
416081			09/12/2019	25/02/2020	21/11/2019	21/11/2019	1	1	9	R		DWR	SFF	BARROW @ EAGLE FARM

Current gauging stations

Figure 65 - Macintyre (416) current gauging stations

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum of interested parties (1-5s)					Flow regime importance where applicable			Interested parties above					Importance	
				Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO
416001	BARWON RIVER AT MUNINGINDI	01/12/1889 UCT	Level Flow Conductivity Temperature	42	72	23	28			17	44	42	11	13	7	6		
416002	MACINTYRE RIVER AT BOGGABILLA	01/10/1894 LF	Level Flow	37	47					19	24	23	7	9				
416003	TENTERFIELD CREEK AT CUPTON	11/07/1922 LF	Level Flow	25	30					10	11	10	6	8				
416006	SEVERN RIVER AT ASHFORD	22/11/1933 LF	Level Flow	39	51					22	29	28	7	10				
416007	DUMARESQ RIVER U/S BONSHAW WEIR	9/08/1934 LF	Level Flow	24	36					17	19	18	5	8				
416008	BLANDY RIVER AT HAYSTACK	10/08/1934 LFR	Level Flow Rainfall	25	36				8	14	17	15	6	9				2
416010	MACINTYRE RIVER AT WALLANGRA	20/12/1936 LF	Level Flow	31	44					20	23	21	7	10				
416011	DUMARESQ RIVER AT ROSENEATH	22/01/1937 LF	Level Flow	28	40					17	19	18	6	9				
416012	MACINTYRE RIVER AT HOLFORD (YELARBON CROSSING)	5/06/1950 UCT	Level Flow Conductivity Temperature	39	50	5	12			22	34	23	8	11	3	3		
416014	MACINTYRE RIVER AT RIVERELL (MIDDLE CREEK)	3/06/1962 UCT	Level Flow Conductivity Temp Rain	34	29	5	11	8	5	5	7	7	5	7	3	3	2	
416020	OTTEYS CREEK AT COOLATAI	28/02/1967 LFR	Level Flow Rainfall	17	23			5		10	12	10	4	6				1
416021	FRAZERS CREEK AT WESTHOLME (ASHFORD)	3/03/1967 LFR	Level Flow Rainfall	20	31			5		19	22	20	5	8				1
416022	SEVERN RIVER AT FLAGSBURY	9/03/1967 LF	Level Flow	24	30					12	13	13	5	7				
416023	DEEPWATER RIVER AT BOLIVIA	10/03/1967 LFR	Level Flow Rainfall	13	18			0		7	8	8	3	5				0
416027	GIL CREEK AT WEEMELAH	30/03/1968 LF	Level Flow	19	26					20	20	19	4	6				
416028	BOOMI RIVER AT NEEWORRA	4/04/1968 GQ	Gaugings and Ratings	15	15					5	5	4	5	4				
416031	MACINTYRE RIVER AT RIDGELANDS	12/03/1969 LFR	Level Flow Rainfall	15	24			5		14	17	17	4	7				1
416032	MOLE RIVER AT DONALDSON	10/07/1969 LFR	Level Flow Rainfall	25	37			8		14	17	15	6	9				2
416037	BOOMI RIVER AT BOOMI WEIR OFFTAK	5/04/1975 LFR	Level Flow Rainfall	29	40			15		19	22	21	6	9				3
416039	SEVERN RIVER AT STRATHBOGE	9/02/1976 LF	Level Flow	20	30					13	16	14	5	8				
416040	DUMARESQ RIVER AT GLENARBON WEIR	5/06/1996 UCT	Level Flow Conductivity Temp Rain	39	51	5	12	8		19	22	22	8	11	3	3	2	
416043	MACINTYRE RIVER U/S BOOMI WEIR	5/07/1976 LF	Level Flow	27	38					19	22	21	6	9				
416046	MACINTYRE RIVER AT BOONANGA BRIDGE	15/01/1981 LF	Level Flow	12	19					7	8	7	3	5				
416047	MACINTYRE RIVER AT TERREWAH	6/12/1984 LF	Level Flow	19	30					14	17	16	4	7				
416048	MACINTYRE RIVER AT KANOWNA	7/11/1984 LF	Level Flow	28	39					14	17	16	6	9				
416050	BARWON RIVER U/S FRESBURY WEIR	28/08/1985 LF	Level Flow	39	48					22	23	22	7	9				
416052	GIL CREEK AT GALLOWAY	27/05/1987 LF	Level Flow	41	54					24	27	26	8	11				
416054	GIL CREEK AT BOOLATABORD	5/12/1996 LF	Level Flow	18	24					17	22	22	4	7				
416055	MIDDLE CREEK AT FERRIDALE	19/12/1996 LF	Level Rainfall	7				5		5	4		4					1
416056	MACINTYRE AT LITTLE VALLEY	31/12/1996 LF	Level Rainfall	8					5	5	4		4					1
416057	MACINTYRE RIVER AT ELSMORE BRIDGE	19/12/1996 LF	Level Rainfall	8				5		5	4		4					1
416058	MACINTYRE RIVER AT YETMAN BRIDGE	27/03/1997 LFR	Level Flow Rainfall	15	23					8	17	16	3	8				1
416059	KINGS CREEK AT GRID	24/01/1997 LF	Level Rainfall	7				5		5	4		4					1
416061	PARADISE CREEK AT PARADISE STATION	25/06/1998 LF	Level Rainfall	9				5		5	4		4					1
416062	KINGS CREEK AT NEWSTEAD NORTH	22/06/1998 LF	Level Rainfall	8				5		5	4		4					1
416063	MACINTYRE RIVER AT WYOMING	24/06/1998 LF	Level Rainfall	8				5		5	4		4					1
416064	MIDDLE CREEK AT STANNIFER	26/06/1998 LF	Level Rainfall	8				5		5	4		4					1
416066	MACINTYRE RIVER AT RIVERSTONE	22/06/2000 LF	Level Rainfall	8				5		5	4		4					1
416067	SEVERN RIVER AT DUCCA MARIN	21/01/2002 LF	Level Flow	27	41					19	22	21	6	9				
416068	MACINTYRE RIVER AT TINTOT	11/07/2002 LFR	Level Flow Rainfall	20	27			8		11	12	12	5	7				2
416069	FRAZERS CREEK AT GLENORCHY	30/05/2002 LFR	Level Flow Rainfall	15	20			5		11	12	12	5	7				1
416072	WHALAN CREEK AT EURABA BRIDGE	6/07/2011 LF	Level Flow	13	18					11	11	10	4	6				
416080	GIL CREEK @ MILTONVILLE	16/08/2011 LF	Level Flow	14	23					17	18	17	4	6				

Current storages

Figure 66 - Macintyre (416) storages

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO
416030	SEVERN RIVER AT PINGARI DAM STORAGE GAUGE	17/01/1969 L	Level Volume Rain	19	35			5		10	10	10	5	8				1
416065	MACINTYRE RIVER AT BOGGABILLA WEIR - STORAGE GAUGE	20/08/1991	Level Volume	17	32					5	5	5	5	8				
416315A	PKKE CREEK AT GLENYTON DAM - STORAGE GAUGE	30/03/1997	Level Volume Rain	19	38			5		10	10	10	4	9				1

Potential Upgrades

Nil

Potential Downgrades

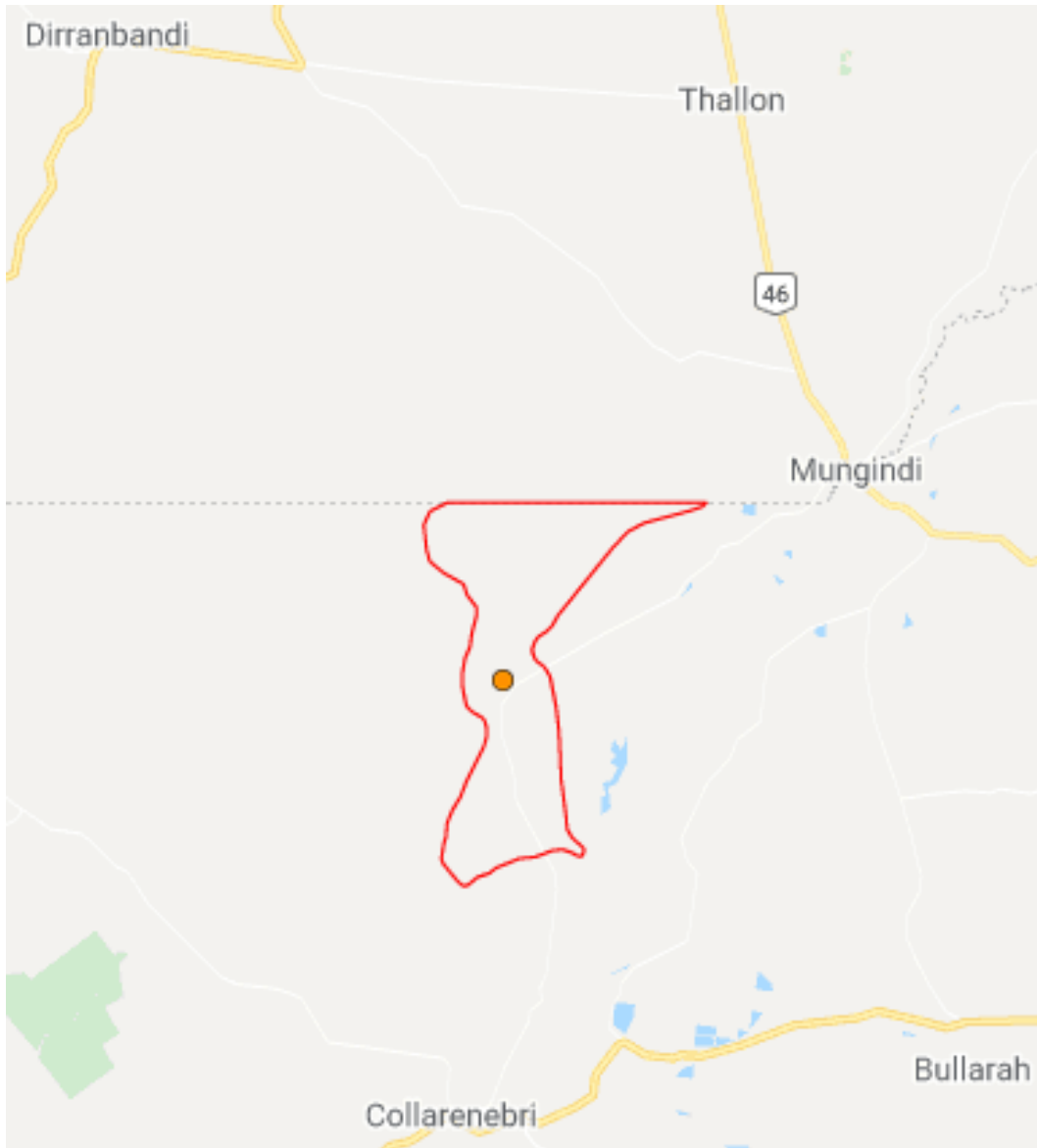
Figure 67 - Macintyre (416) potential downgrade sites

STATION #	STNAME	COMMENCE	CURRENT PARAMETERS
416023	DEEPWATER RIVER AT BOLIVIA	10/03/1967	Level Flow Rainfall
416046	MACINTYRE RIVER AT BOONANGA BRIDGE	15/01/1981	Level Flow
416069	FRAZERS CREEK AT GLENORCHY	30/05/2002	Level Flow Rainfall
416028	BOOMI RIVER AT NEEWORRA	4/04/1968	Gaugings and Ratings
416072	WHALAN CREEK AT EURABA BRIDGE	6/07/2011	Level Flow

Moonie (417)

Telemetry Sites

Figure 68 - NSW extent of Moonie (417) showing telemetered gauging stations - Source WaterNSW website



Data Inventory

Figure 69 - Data Inventory Moonie gauging stations - Source WaterNSW website

SURFACE WATER Archive Data Inventory for #17-Moonie River Basin																		
\$=Telemetered																		
*=Storage																		

Station ID	FLOWS		HEIGHTS		RATINGS		No. No.		R A W C T		W H O		Discont.	Org. Net	Code	Class	NAME	
	Start	End	Start	End	First Starts	Last Starts	Last of Tab	No. of Tabs	a t t o u i m m n r p n p p d b H d d g	u x i u x n m y Date								
\$417001	01/01/1945	01/01/2019	10/12/1970	17/06/2020	24/08/1944	02/03/2020	155	40	369					DWR	PPS	MOONIE @	GUNDABLOUIE	

Current gauging stations

Figure 70 - Moonie (417) current gauging stations

			Sum of interested parties (1-5c)						Flow regime importance where applicable			Interested parties above						Importance	
STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO	
				30	37					27	27	24	6	8					
417001	MOONIE RIVER AT GUNDA	24/08/1944 LF	Level Flow																

Current storages

Nil

Potential Upgrades

Nil

Potential Downgrades

Nil

Gwydir (418)

Telemetry Sites

Figure 71 - Gwydir (418) showing telemetered gauging stations - Source WaterNSW website

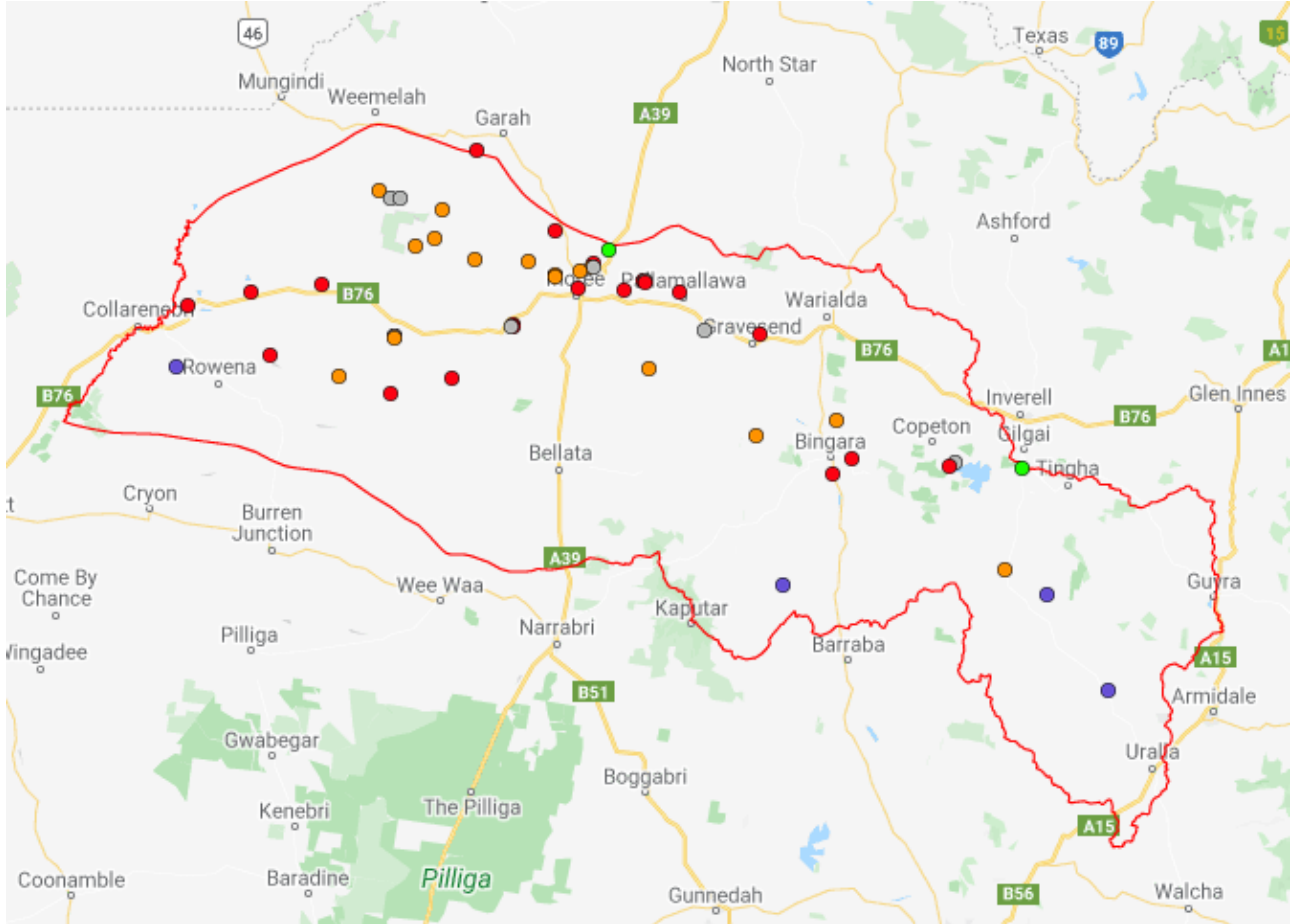


Figure 74 - Gwydir (418) current gauging stations 2 of 2

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum of interested parties (1-5)						Flow regime importance where applicable			Interested parties above						Importance
				Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO	
418087	MEH RIVER AT CHINDOK	23/05/2006 LP	Level Flow	21	36					20	21	19	5	9					
418088	Marshall Ponds @ Ashley	6/10/2005 GQ	Gaugings and Ratings		17					10	8	10							
418089	Marshall Ponds @ Newell Highway	6/10/2005 LP	Level Flow	14	26					14	12	13	4	7					
418091	THALABA CREEK AT BELARRE	1/07/2011 LP	Level Flow	16	27					15	14	16	4	7					
418092	SLAUGHTERHOUSE CREEK AT BINIGUY	25/07/2011 LP	Level Flow	14	25					14	12	14	4	7					

Current storages

Figure 75 - Gwydir (418) current storages

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum of interested parties (1-5)						Flow regime importance where applicable			Interested parties above						Importance
				Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO	
418033	GWYDIR RIVER AT COPETON DAM STORAGE GAUGE	13/12/1973 L	Level Volume Rain	14	41					10	10	10	4	9					1
418041	GWYDIR RIVER AT TARELLARO WEIR STORAGE GAUGE	5/05/1979 L	Level Volume	12	31					5	5	5	2	8					
418051	GWYDIR RIVER AT BOOLOOROO WEIR STORAGE GAUGE	25/01/1979 L	Level Volume	9	31					5	5	5	2	8					

Potential Upgrades

Figure 76 - Gwydir (418) potential upgrade sites

	Basin- Site ID	Location	Current Monitoring (July 2020)	Request type (flow and storage levels)	Request reason - Summary	Request Status
418	418049	MALLAWA CREEK AT REGULATOR	Level Flow	Level Flow	Relocate to a better site	Proposed - Subject to further client consultation and review
418	418074	GINGHAM CHANNEL AT TERALBA	Level Flow	Level Flow	Relocate to a better site	Proposed - Subject to further client consultation and review
418	418077	Gingham Channel @ Waterhole	Level	Level	Upgrade of infrastructure to produce more reliable flow data	Proposed - Subject to further client consultation and review

Potential Downgrades

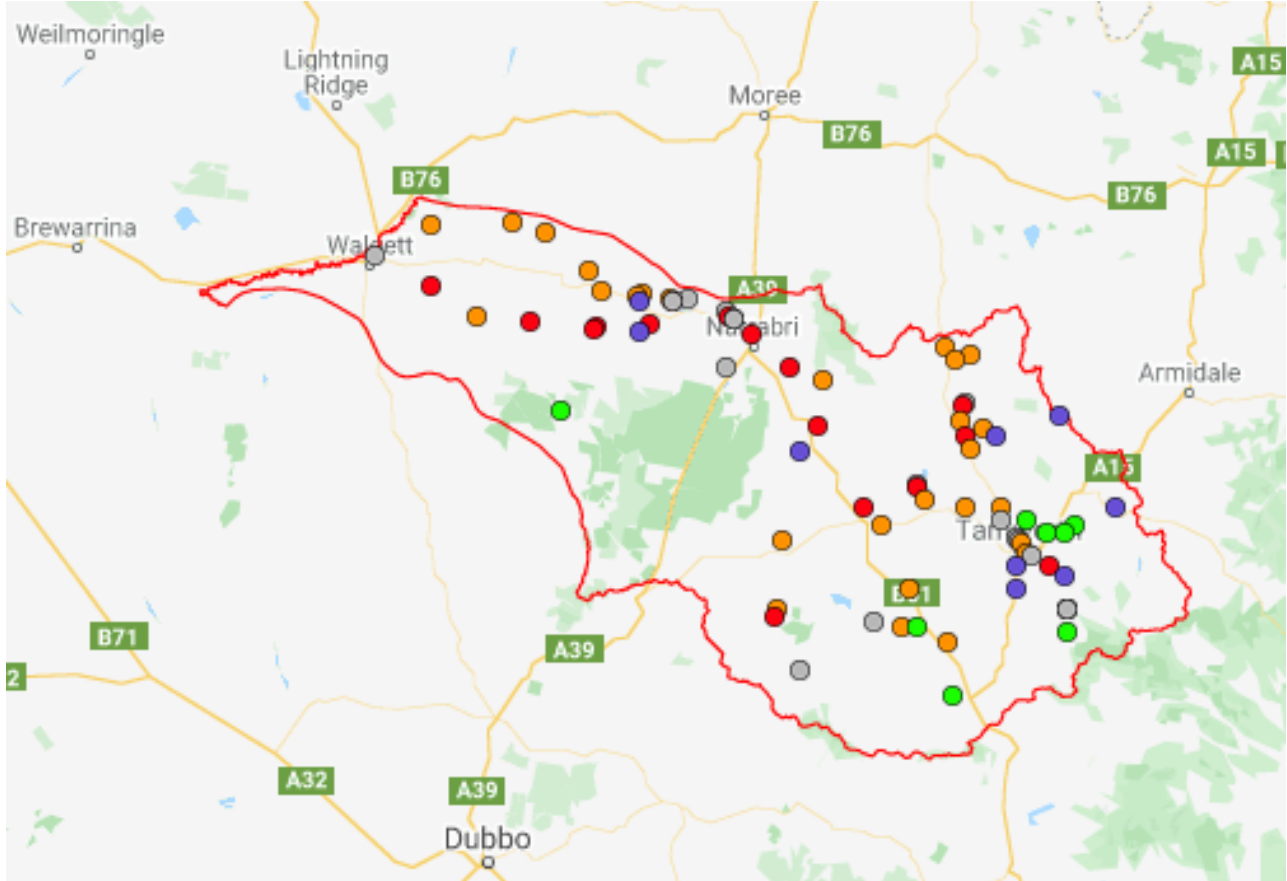
Figure 77 - Gwydir (418) potential downgrade sites

STATION #	STNAME	COMMENCE	CURRENT PARAMETERS
41801001	HORTON RIVER UPSTREAM COBBADAH CREEK	28/08/2000	Gaugings and Ratings
41801004	ROCKY CREEK UPSTREAM HORTON JUNCTION	29/08/2000	Gaugings and Ratings
41801006	PALLAL CREEK AT UPSTREAM HORTON RIVER JUNCTION	29/08/2000	Gaugings and Ratings
41801002	COBBADAH CREEK AT DEVON POINT(UPSTREAM HORTON JUNCTION)	28/08/2000	Gaugings and Ratings
418062	Moomin Creek off take	27/07/1972	Gaugings and Ratings
418088	Marshall Ponds @ Ashley	6/10/2005	Gaugings and Ratings
418092	SLAUGHTERHOUSE CREEK AT BINIGUY	25/07/2011	Level Flow
418089	Marshall Ponds @ Newell Highway	6/10/2005	Level Flow

Namoi (419)

Telemetry Sites

Figure 78 - Namoi (419) showing telemetered gauging stations - Source WaterNSW website



Data Inventory

Figure 79 - Data Inventory Namoi (419) gauging stations 1 of 2 - Source WaterNSW website

SURFACE WATER Archive Data Inventory for 419-Namoi River Basin																			
*Telemetered																			
**Storage																			
Station ID	FLOWS		HEIGHTS		RATINGS		No. No.		RAWCT		WHO		Discont.	Org. Code	Net Class	NAME			
	Start	End	Start	End	First Starts	Last Starts	Last of Tab	No. of Tabs	at of imm n r p n m y	at t o u	i u x	Date							
\$419001	01/01/1891	01/01/2017	01/01/1864	26/06/2020	23/07/1921	15/05/2016	330	107	932	T	C	B		DWR	SFP	NAMOI @ GUNNEDAM			
\$419003	01/01/1891	01/01/2017	08/08/1891	10/07/2020	01/08/1891	14/04/2020	175	99	671	T	C			DWR	SFP	NARRABRI CK@NARRABRI			
\$419005	01/01/1915	01/01/2017	10/12/1915	18/05/2020	10/12/1915	31/08/2016	204	67	712	T	T	C		DWR	SFP	NAMOI @ NTH CUERINDI			
\$419006	01/01/1923	01/01/2017	27/12/1923	25/06/2020	04/12/1923	07/06/2019	269	111	895					DWR	SFP	PEEL @ CARROLL GAP			
\$419007	01/01/1923	01/01/2017	15/01/1910	25/06/2020	04/12/1923	21/04/2017	277	100	811		T			DWR	SFP	NAMOI@D/S KEEFIT DAM			
\$419009	01/01/1925	01/01/2017	14/01/1910	07/07/2020	23/01/1925	16/08/2012	113	37	329					DWR	FRF	PEEL @ TAMWORTH			
\$419010	01/01/1927	01/01/2017	29/11/1927	28/05/2020	25/10/1927	18/02/2020	211	88	636	R				DWR	PI	MACDONALD @WOOLBROOK			
\$419012	01/01/1913	01/01/2017	01/02/1955	06/07/2020	12/02/1937	01/01/2020	139	82	716					DWR	SFS	NAMOI @ BOGGABRI			
\$419015	01/01/1936	01/01/2017	30/01/1971	30/06/2020	01/07/1936	15/12/2019	168	92	628					DWR	SFP	PEEL @ FIALAMORE			
\$419016	01/01/1936	01/01/2017	25/02/1955	16/06/2020	01/07/1936	17/01/2020	246	95	633	R	T	C	B		DWR	SFS	COCKBURN @MULLA KING		
\$419020	01/01/1948	01/01/2017	16/10/1954	02/07/2020	24/01/1977	09/01/2018	259	56	592		T	C	B	P	O		DWR	SFS	MANILLA @ BRABRI
\$419021	01/01/1951	01/01/2017	31/03/1952	09/06/2020	09/04/1951	17/02/2020	225	58	555					DWR	SFP	NAMOI @ BUGILBONE			
\$419022	01/01/1952	01/01/2017	02/02/1942	19/05/2020	01/01/1900	17/03/2019	238	99	702					DWR	SFS	NAMOI @ MANILLA			
\$419023	01/01/1953	01/01/2017	07/11/1972	24/06/2020	01/01/1900	01/05/1995	300	2	237					DWR	CF	NAMOI @ TURRAMAN			
\$419024	01/01/1953	01/01/2017	19/10/1954	30/06/2020	11/12/1970	18/06/2015	293	54	531		T	C	B		DWR	SFP	PEEL@U/S PARADISE WR		
\$419026	01/01/1954	01/01/2017	01/03/1955	09/06/2020	15/05/1958	29/02/2020	282	58	482		T	C	B		DWR	SFP	NAMOI @ GOANGRA		
\$419027	01/01/1957	01/01/2017	13/01/1964	14/07/2020	01/09/1957	01/01/2020	239	61	465		T			DWR	SFS	MOOKI @ BREEZA			
\$419028	01/01/1965	01/01/2017	30/09/1982	27/05/2020	21/07/1982	12/01/2020	117	23	299	R				DWR	PI	MACDONALD @ RETREAT			
\$419029	01/01/1965	01/01/2017	30/11/1978	17/06/2020	26/11/1977	15/10/2019	294	78	406					DWR	PI	HALLS CK @ UOLAN			
\$419032	01/01/1965	01/01/2017	17/10/1977	09/06/2020	31/12/1974	01/01/2019	127	25	283	R	T	C	B	W		DWR	SFS	COXS CK @ BOGGABRI	
\$419033	01/01/1965	01/01/2017	16/06/1981	18/06/2020	25/10/1980	01/01/2020	248	76	270	R	T	C	B		DWR	SFS	COXS @STAMBAR SPRINGS		
\$419034	01/01/1965	01/01/2017	22/05/1979	30/06/2020	13/08/1965	01/01/2020	197	61	328	R	T	C	B		DWR	SFS	MOOKI @ CAROONA		
\$419035	01/01/1969	01/01/2017	04/06/1965	08/07/2020	25/07/1981	19/02/2020	233	79	383	R				DWR	PI	GOONOO @ TIMBUMBURI			
\$419039	01/01/1965	01/01/2017	28/02/1955	25/06/2020	23/09/1972	09/02/2020	318	79	498		T	C	B		DWR	SFP	NAMOI @ MOLLEE		
\$419039A			01/01/1996	02/01/1996	01/01/1900	09/02/2020	70	22	325					DWR	CR	NAMOI @ D/S MOLLEE W			
\$419041	*		01/07/1974	21/05/2020						R				DWR	SFH	KEEFIT DAM			
\$419043		01/01/1968	01/01/2017	06/06/1973	24/01/2020	19/06/1968	20/10/2018	178	60	469				DWR	SFS	MANILLAND/S SPLTROCK			
\$419045		01/01/1968	01/01/2017	22/05/1972	17/06/2020	22/05/1972	13/01/2020	335	65	447				DWR	SFP	PEEL@D/S CHAFFEY DAM			
\$419049		01/01/1972	01/01/2017	14/06/1972	09/06/2020	28/03/1972	25/07/2017	201	49	296				DWR	SFP	PIAN CK @ WAMINDA			
\$419051		01/01/1972	01/01/2017	15/07/1975	24/06/2020	01/01/1972	01/01/2019	259	64	348				DWR	PI	MAULES CKB@VOCA EAST			
\$419053		01/01/1972	01/01/2017	22/08/1972	24/02/2020	22/08/1972	26/08/2018	369	73	332				DWR	PI	MANILLAS@BLACK SPRING			
\$419054		01/01/1974	01/01/2017	21/05/1974	16/06/2020	21/05/1974	01/09/1998	234	33	289				DWR	PI	SWAMP OAK CK @LIMBRI			
\$419056		01/01/1996	01/01/2017	19/11/1996	02/07/2020	01/01/2001	19/02/2020	48	39	332				DWR	SFP	MANILLASUPPER MANILLA			
\$419059		01/01/1976	01/01/2017	07/04/1976	30/06/2020	11/09/1975	01/10/2018	130	30	325				DWR	SFP	NAMOI @D/S GUNIDGERA			
\$419060	*			14/12/2006	30/06/2020									DWR	CH	NAMOI@GUNIDGERA STOR			
\$419061		01/01/1975	01/01/2017	29/07/1975	30/06/2020	29/07/1975	21/09/2016	165	66	363				DWR	SFP	GUNIDGERA CK@D/S REG			
\$419062	*			14/12/2006	30/06/2020									DWR	CH	NAMOI@MOLLEE WR STOR			
\$419063		01/01/1998	01/01/2014	28/10/1998	24/06/2020	01/10/1998	17/10/2017	23	14	288				DWR	SFP	GUNIDGERA-PIAN CUTTING			
\$419064		01/01/1990	01/01/2017	01/10/1990	24/06/2020	01/01/1990	18/02/2020	29	21	278				DWR	SFP	PIAN CK @ ROSSMORE			
\$419068		01/01/1978	01/01/2017	26/10/1978	24/06/2020	25/10/1978	10/02/2020	202	51	315				DWR	SFP	NAMOI@D/S WEETA WEIR			
\$419069	*			01/06/1979	17/06/2020						R	T			DWR	SFH	CHAFFEY DAM		
\$419070		01/01/1980	01/01/2017	25/06/1980	25/05/2020	01/01/1900	03/09/2019	121	21	274				DWR	SFP	PEEL @ TAMWORTH W/S			
\$419073		01/01/1996	01/01/2017	31/10/1996	25/06/2020	01/01/1900	27/02/2020	116	16	191				DWR	SFH	PEEL @ APFLEY			
\$419074		01/01/1996	01/01/2017	29/10/1996	10/07/2020	24/10/1996	12/02/2020	126	35	210				DWR	SFH	PEEL @ BECTIVE			
\$419076		01/01/1982	01/01/2017	15/06/1982	29/06/2020	15/06/1982	15/09/2016	248	60	186	R	T	C	B		DWR	PI	WARRAH @ OLD WARRAH	
\$419079		01/01/1998	01/01/2017	03/09/1998	24/06/2020	01/12/2000	14/04/2020	72	23	219				DWR	SFP	GUNIDGERA@D/S CUTTING			
\$419080	*			22/12/1989	19/05/2020	31/01/2000	31/01/2000	1	1					DWR	SFH	SPLIT ROCK DAM			
\$419081		01/01/1991	01/01/2017	05/07/1991	17/06/2020	05/07/1991	21/05/2018	37	37	201	R	T	C	B		DWR	SFH	PEEL @ TAROONA	
\$419083		01/01/1993	01/01/2017	14/10/1993	24/06/2020	01/07/1993	31/03/2019	20	20	150				DWR	SMS	BRIGALOW CK @THARLINE			
\$419084		01/01/1994	01/01/2017	29/06/1994	14/07/2020	29/06/1994	23/03/2017	18	18	155	R	T	C	B	W		DWR	CR	MOOKI @ RUWINE
\$419085		01/01/1995	01/01/2017	07/06/1995	18/06/2020	01/03/1995	06/03/2018	29	29	97	R	T	C	B		DWR	CR	BOHERA CK @STAMBAR RD	
\$419086		01/01/1995	01/01/2017	06/12/1995	19/06/2020	01/11/1995	21/04/2020	31	31	102	R	T	C	B		DWR	CR	BUNDILLA CK@BUNDILLA	

Figure 80 - Data Inventory Namoi (419) gauging stations 2 of 2 - Source WaterNSW website

Station ID	FLOWS		HEIGHTS		RATINGS		No. No.		RAWCT		WHO		Discont.	Org. Code	Net Class	NAME
	Start	End	Start	End	First Starts	Last Starts	Last of Tab	No. of Tabs	at of imm n r p n m y	at t o u	i u x	Date				
\$419088	01/01/1996	01/01/2017	07/11/1996	21/07/2020	01/07/1996	11/01/2018	10	10	169		T			DWR	SFP	PIAN CK @ CUBBAROO
\$419089	01/01/1996	01/01/2017	05/11/1996	09/06/2020	01/11/1996	23/02/2020	49	30	167		T			DWR	SFP	PIAN CK @ DEMPSEYS
\$419090	01/01/1996	01/01/2013	07/11/1996	24/06/2020	01/01/2001	14/04/2020	19	19	165		T			DWR	SFP	B+B CH @ DOREEN LAKE
\$419091	01/01/1996	01/01/2017	18/11/1996	21/07/2020	01/01/1900	15/07/2020	30	22	165		T			DWR	SFP	NAMOI @ U/S WALGETT
\$419093			02/03/1999	19/06/2020	01/01/1900	01/01/1900	1	1						DWR	CH	YARRAMAN @ SPRING RG
\$419094	01/01/2000	01/01/2017	20/01/1995	09/06/2020	01/01/2000	12/02/2020	18	18	154					DWR	SFP	NAMOI @D/S DUNCANS J
\$419095	01/01/2000	01/01/2017	18/04/2000	09/06/2020	01/10/2000	12/02/2020	27	23	158		T			DWR	SFP	NAMOI @ BULLAWA
\$419096			20/07/2001	26/05/2020	01/01/1900	01/01/1900	1	1						DWR	SFH	PEEL @CHAFFEY OUTLET
\$419097	01/01/2002	01/01/2017	06/08/2002	08/07/2020	05/08/2002	27/02/2020	25	25	122		T	C	B	DWR	SMS	GOONOO @ MEADOWS LAN
\$419098	01/01/2003	01/01/2017	21/05/2003	29/06/2020	01/05/2003	25/01/2016	3	3	66					DWR	SMS	QUTRINDI @ GREENEAK
\$419099	01/01/2006	01/01/2017	23/02/2006	01/07/2020	23/02/2006	24/06/2016	14	12	95		T	C		DWR	PRF	COCKBURN @ KOOTINGAL
\$419102	01/01/2010	01/01/2017	26/08/2010	28/04/2020	08/07/2010	30/03/2019	6	6	48					DWR	CR	COXS CK @ TOURABLE
\$419103	01/01/2010	01/01/2017	24/09/2010	01/07/2020	24/09/2010	05/04/2020	9	9	57					DWR	CR	DGWN CK @ U/S DGWN
\$419104	01/01/2010	01/01/2017	24/09/2010	01/07/2020	24/09/2010	27/02/2020	3	3	53					DWR	CR	MOORE CK @ SLP ROCK
\$419105			17/05/2011	09/06/2020	16/05/2011	30/03/2019	8	8	68					DWR	CR	BARADINE CK @ GWABGR
\$419106	01/01/2011	01/01/2017	11/04/2011	03/06/2020	01/01/1990	17/02/2020	12	13	66		T	C	B	DWR	CR	QUTRINDI@DURY BRIDGE
\$419107			08/09/2011	03/07/2020	17/11/2009	01/05/2020	16	16	80					DWR	CR	MANILLA RVR @BARRABA
\$419108			08/09/2011	09/06/2020	08/09/2011	19/02/2020	8	8	89					DWR	CR	NAMOI@YARRALDOOL
\$419110			29/06/2012	18/02/2020										DWR	CH	NAMOI @ YARRAL EAST
\$419111	01/01/2012	01/01/2017	07/08/2012	09/06/2020	03/08/2012	29/06/2017	7	7	67					DWR	CR	PIAN CK @ OLD BURREN
\$419112	01/01/2015	01/01/2017	22/07/2014	03/07/2020	04/12/2014	31/03/2017	3	3	36					DWR	SFS	IRONBARK @WOODREEF 2
\$419113														DWR	PI	DPI-TAMWORTH AWS
\$419116														DWR	WQR	D/S Jewry St Weir
\$419117														DWR	WQR	Peel R Bourne Lane
\$419900			22/09/1932	24/06/2020										DWR	CF	NAMOI @ GLENCOE
\$419905	01/01/1995	01/01/2017	04/03/1977	24/06/2020	08/06/1995	16/06/2005	2	2	2					DWR	CF	BOHEHA CK @ NEWELL

STATION #	STNAME	COMMENT CODE	CURRENT PARAMETERS	Sum of interested parties (1-5)					Flow regime importance where applicable			Interested parties above					Importance				
				Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO			
419001	NAMOI RIVER AT GUNDEDAH	27/11/1891 LUCT	Level Flow Conductivity Temperature	35	46	13	13			31	31	32	5	11	4	3					
419002	NAMOI RIVER AT NARRABRI	11/01/1892 GQ	Gaugings and Ratings	29	24					20	20	24	7	7							
419003	NARRABRI CREEK AT NARRABRI	01/01/1891 LUCT	Level Flow Conductivity Temperature	29	54	15	15			30	37	38	7	11	4	3					
419005	NAMOI RIVER AT NORTH CLUEBUNDI	10/12/1951 LFT	Level Flow Temperature	27	43		5			26	28	27	6	10		1					
419006	PEEL RIVER AT CARROLL GAP	4/12/1923 LF	Level Flow	36	54					37	39	38	8	12							
419007	NAMOI RIVER AT DOWNSTREAM KEPT DAM	14/01/1924 LFT	Level Flow Temperature	32	50		8			39	39	38	7	11		2					
419010	MACDONALD RIVER AT WOODBROOK	26/10/1927 LFR	Level Flow Rainfall	24	37			8		27	28	25	6	9			2				
41901010	QUIPOLI CK AT U/S KAMLAARDI HIGHWAY	14/04/2005 LT	Level Temperature	20			0				10	9	5			0					
419012	NAMOI RIVER AT BOGGABRI	16/11/1911 LF	Level Flow	32	50					36	43	44	6	10							
419013	PEEL RIVER AT PALLAMAROI	1/07/1936 LF	Level Flow	22	40					32	34	32	5	9							
419016	COCKBURN RIVER AT MULLA CROSSING	1/07/1936 LUCT	Level Flow Conductivity Temperature	30	47	15	15			30	32	29	7	11	4	3					
419020	MANILLA RIVER AT BRABRI (MERRIWEE)	18/08/1942 LF	Level Flow	19	36					32	34	33	5	9							
419021	NAMOI RIVER AT BUGBEGONE (RIVERVIEW)	9/04/1951 LF	Level Flow	36	55					31	30	39	7	11							
419022	NAMOI RIVER AT MANILLA RAILWAY BRIDGE	18/05/1941 LF	Level Flow	33	51					31	38	39	7	11							
419024	PEEL RIVER UPSTREAM PARADISE WEIR	9/11/1953 LUCT	Level Flow Conductivity Temperature	29	45	10	10			26	28	29	6	10	3	2					
419026	NAMOI RIVER AT GOANGRA	5/08/1954 LUCT	Level Flow Conductivity Temperature	50	65	13	13			36	43	44	9	12	4	3					
419027	MOOKI RIVER AT BREZZA	3/08/1957 LF	Level Flow	36	54					36	38	39	6	10							
419028	MACDONALD RIVER AT RETREAT	20/05/1905 LFR	Level Flow Rainfall	24	38			8		23	27	26	6	9			2				
419029	HALLS CREEK AT UKOLAN	22/05/1905 LF	Level Flow	18	33					26	28	28	5	9							
419031	COXS CREEK AT BOGGABRI	3/06/1965 LUCTR	Level Flow Conductivity Temp Rain	36	53	15	15	8		31	33	36	8	12	4	3	2				
419033	COXS CREEK AT TAMBAR SPRINGS	9/06/1965 LFR	Level Flow Rainfall	22	34			5		24	24	26	5	8			1				
419034	MOOKI RIVER AT CAROONA	10/04/1905 LFR	Level Flow Rainfall	25	40			5		25	27	29	6	10			1				
419035	GOONDOO GOONDOO CREEK AT TIMBUMBURI	16/06/1905 LFR	Level Flow Rainfall	26	36			8		26	28	32	6	9			2				
419039	NAMOI RIVER AT MOLLEE	30/09/1965 LF	Level Flow	36	54					36	38	39	6	10							
419039A	NAMOI RIVER DOWNSTREAM MOLLEE WEIR	23/06/1967 GQ	Gaugings and Ratings	32						39	39	30	7	10							
419041	MANILLA RIVER AT DOWNSTREAM SPLIT ROCK DAM	27/05/1968 LF	Level Flow	33	44					33	33	34	7	10							
419041	PEEL RIVER D/S CHAFFY DAM	16/12/1968 LF	Level Flow Temperature	50	65			8		38	38	39	8	12		2					
419049	PIAN CREEK AT WAMINDA	28/01/1972 LF	Level Flow	40	52					35	37	35	8	11							
419051	MAULES CREEK AT AVOCA EAST	8/06/1972 LF	Level Flow	27	38					26	28	30	6	9							
419053	MANILLA RIVER AT BLACK SPRINGS	23/08/1972 LF	Level Flow	29	36					24	24	26	7	9							
419054	SWAMP OAK CREEK AT LIMBRI	17/05/1974 LF	Level Flow	19	24					18	18	22	5	7							
419054	MANILLA RIVER AT UPPER MANILLA	28/06/1941 LF	Level Flow	21	31					25	27	28	5	8							
419059	NAMOI RIVER AT DOWNSTREAM GUNDGERA WEIR	7/04/1976 LF	Level Flow	29	40					31	33	34	6	9							
419061	GUNDGERA CREEK AT DOWNSTREAM REGULATOR	10/01/1975 LF	Level Flow	29	37					29	29	30	6	8							
419061	GUNDGERA-PIAN CUTTING AT MERAH NORTH	6/01/1978 LF	Level Flow	25	32					29	29	30	6	8							
419064	PIAN CREEK AT ROSSMORE	5/01/1978 LF	Level Flow	23	35					31	33	34	6	9							
419066	NAMOI RIVER AT DOWNSTREAM WETTA WEIR	26/06/1978 LF	Level Flow	29	39					29	31	32	6	9							
419070	PEEL RIVER AT TAMWORTH WATER SUPPLY	25/06/1980 LF	Level Flow	28	32					33	33	34	7	8							
419073	PEEL RIVER AT APPLEBY CROSSING	21/01/1981 LF	Level Flow	23	30					24	26	27	5	8							
419074	PEEL RIVER AT BECTIVE	22/01/1981 LF	Level Flow	23	31					24	26	27	5	8							
419075	PEEL RIVER AT SOMERTON	22/01/1981 LF	Level Flow	22	26					22	22	23	5	7							
419076	WARRAH CREEK AT OLD WARRAH	15/06/1982 LFR	Level Flow Rainfall	15	19			5		12	12	15	4	6			1				
419079	GUNDGERA CREEK AT DOWNSTREAM PIAN CUTTING	17/04/1986 LF	Level Flow	26	38					34	36	37	7	10							
419081	PEEL RIVER AT CAROONA	5/07/1991 LFR	Level Flow Rainfall	32	40			8		24	24	26	7	9			2				
419081	BRIALDOW CREEK AT THARLANE	13/10/1993 LF	Level Flow	26	37					26	28	31	6	9							

Figure 82 - Data Inventory Namoi (419) current gauging stations 2 of 2

STATION #	STNAME	COMMENT CODE	CURRENT PARAMETERS	Sum of interested parties (1-5)						Flow regime importance where applicable				Interested parties above						Importance	
				Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO			
419004	MOOKI RIVER AT RUVIONE	25/06/1954 LUCT	Level Flow Conductivity Temperature	21	32	10	5			19	21	25	5	9	2	1					
419005	BOMERA CREEK AT TAMBAR-PRIMER ROAD	6/06/1955 LFR	Level Flow Rainfall	22	28			5		20	20	23	6	9			1				
419006	BUNDILLA CREEK AT BUNDILLA	5/12/1955 LFR	Level Flow Rainfall	17	24			5		15	15	18	5	8			1				
419008	PIAN CREEK AT CUMBAROO LAKE	7/11/1956 LF	Level Flow	21	31					24	26	27	5	8							
419009	PIAN CREEK AT DEMPSEYS BRIDGE	5/11/1956 LF	Level Flow	26	38					31	33	32	6	9							
419009	B4 CHANNEL AT DOREEN LAKE	7/11/1956 LF	Level Flow	18	25					19	19	20	4	7							
419051	NAMOI RIVER AT UPSTREAM WALGETT	10/11/1956 LF	Level Flow	34	46					39	38	39	7	10							
419054	NAMOI RIVER AT DOWNSTREAM DUNCANS JUNCTION	10/01/2000 LF	Level Flow	26	35					22	22	23	6	8							
419059	NAMOI RIVER AT BULLAWA	10/01/2000 LF	Level Flow	26	39					24	26	27	6	9							
419057	GOONDOO GOONDOO CREEK AT MEADOWS LAKE	1/06/2002 LUCTU	Level Flow Cond Temp Turbidity	25	33	10	5			21	23	26	6	9	2	1					
419058	QUIRINDO CREEK AT GREENACRES	21/05/2003 LF	Level Flow	25	31					22	22	23	6	8							
419059	COCKBURN RIVER AT KOOTINGAL	7/04/2003 LUCT	Level Flow Conductivity Temperature	31	41	15	10			23	23	26	7	9	3	2					
419102	COXS CREEK AT TOUROLLE	26/08/2010 LF	Level Flow	22	28					23	23	24	6	8							
419103	DUNGOVAN CREEK AT US DUNGOVAN	24/09/2010 LF	Level Flow	27	34					24	24	28	6	8							
419104	MOORE CREEK AT SUPPLY ROCK	24/09/2010 LF	Level Flow	21	26					22	22	25	6	8							
419105	BAARDINE CREEK AT GWAIBAGAR	17/05/2011 LF	Level Flow	24	30					22	22	25	6	8							
419106	QUIRINDO CREEK AT DURY BRIDGE	17/05/2011 LF	Level Flow	31	37					31	33	36	7	9							
419107	MANILLA RIVER AT BARRABA	17/11/2009 LF	Level Flow	24	31					24	24	28	6	8							
419108	NAMOI RIVER AT YARRALDOOL	25/07/2011 LF	Level Flow	26	38					28	28	29	6	8							
419111	PIAN CREEK AT OLD BURRIN NO2	7/06/2012 LF	Level Flow	24	33					26	26	27	6	8							
419112	IRONBARK CREEK AT WOODSREEF NUMBER 2	22/07/2014 LF	Level Flow	20	27					21	21	25	6	8							

Current storages

Figure 83 - Data Inventory Namoi (419) current storages

STATION #	STNAME	COMMENT CODE	CURRENT PARAMETERS	Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO
419041	NAMOI RIVER AT KEPT DAM - STORAGE GAUGE	26/05/1965 L	Level Volume Rain	39	37				5	20	20	20	5	9				1
419060	NAMOI RIVER AT GUNDGERA WEIR - STORAGE GAUGE	6/11/1975 L	Level Volume	17	31					13	15	15	5	8				
419062	NAMOI RIVER AT MOLLEE WEIR - STORAGE GAUGE	5/11/1975 L	Level Volume	17	34					20	20	18	3	8				
419066	GORAN LAKE AT HOKEY POKEY	10/01/1974 M	Level	34						13	13	13	5	9				1
419069	PEEL RIVER AT CANNIVY DAM - STORAGE GAUGE	2/01/1979 L	Level Volume Rain	29	39			5		20	20	20	5	9				
419080	MANILLA RIVER AT SPLIT ROCK DAM STORAGE GAUGE	8/05/1985 L	Level Volume Rain	22	39			5		20	20	20	5	9				1

Potential Upgrades

Figure 84 - Namoi (419) potential upgrade sites

Basin- Site ID	Location	Current Monitoring (July 2020)	Request type (flow and storage levels)	Request reason - Summary	Request Status
419066	Lake Goran at Hokey Pokey	Staff Gauge	Level	For WSP - Upgrade Storage Level for more reliable Storage Data	Proposed - Subject to further client consultation and review
419091	Namoi @ Walgett	Flow	Flow	To relocate for better WSP PEW measuremet	Proposed - Subject to further client consultation and review
419099	COCKBURN RIVER AT D/S KOOTINGAL BRIDGE WEIR	Conductivity Temperature		Relocate	Recommend to Install
419114	COCKBURN RIVER AT D/S KOOTINGAL BRIDGE WEIR	No Data Collected	Flow	Required for WSP (near Tamworth)	Proposed - Subject to further client consultation and review
41999999	Dungowan Creek at Thortons Road Bridge		Flow	To support Namoi-Peel WSP	Proposed - Subject to further client consultation and review
41999999	Goonoo Goonoo Creek upstream of Calala Lane Road Bridge		Flow	To support Namoi-Peel WSP	Proposed - Subject to further client consultation and review
41999999	West of Narrabri		Flow	To support Namoi-Peel WSP	Proposed - Subject to further client consultation and review

Potential Downgrades

Figure 85 - List 33 Namoi (419) potential downgrade sites

STATION #	STNAME	COMMENCE	CURRENT PARAMETERS
419076	WARRAH CREEK AT OLD WARRAH	15/06/1982	Level Flow Rainfall
419086	BUNDELLA CREEK AT BUNDELLA	5/12/1995	Level Flow Rainfall
419054	SWAMP OAK CREEK AT LIMBRI	17/05/1974	Level Flow

Nil

Castlereagh (420)

Telemetry Sites

Figure 86 - Castlereagh (420) showing telemetered gauging stations - Source WaterNSW website



Data Inventory

Figure 87 - Data Inventory Castlereagh (420) gauging stations - Source WaterNSW website

SURFACE_WATER Archive Data Inventory for 420-Castlereagh River Basin														
S=Telemetered														
**=Storage														
Station ID	FLOWS		HEIGHTS		RATINGS		RAWCT		WHO		Discont.	Org. Net	NAME	
	Start	End	Start	End	First Starts	Last Starts	Last of Tab	No. of Tabs	att ou	im m n r p n m y				
\$420003	01/01/1951	01/01/2017	25/01/1972	27/05/2020	30/08/1951	16/01/2020	191	37	337	R		DWR	PI	BELAR CK @ WARKTON
\$420004	01/01/1913	01/01/2017	15/01/1910	19/02/2020	01/01/1953	03/03/2004	430	89	238			DWR	CF	CASTLEREAGH@MENDOORAN
\$420007	01/01/1965	01/01/2017	25/08/2010	26/05/2020	27/08/2010	23/02/2016	15	2	170			DWR	CR	CASTLEREAGH @BINNAWAY
\$420017	01/01/1980	01/01/2017	26/02/1980	26/05/2020	01/01/1980	16/01/2020	181	16	200	T C		DWR	PFS	CASTLEREAGH@HIDDEN VLY
\$420020	01/01/2001	01/01/2017	30/05/2001	10/06/2020	30/05/2001	25/02/2020	41	8	76	T C		DWR	PFS	CASTLEREAGH@GUNGALMUN
\$420022	01/01/2011	01/01/2017	26/08/2010	27/05/2020	26/08/2010	26/08/2010	5	1	34			DWR	CR	CASTLEREAGH@COONA#3
\$420901			24/02/1955	10/01/2020	30/12/1998	24/11/1999	5	2				DWR	FRH	CASTLEREAGH@LUCAS BR

Current gauging stations

Figure 88 - Castlereagh (420) catchment current gauging stations

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum of interested parties (1-5s)						Flow regime importance where applicable				Interested parties above						Importance
				Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow		Level	Flow	EC	Temp.	Rain	DO	
420001	BELAR CREEK AT WARKTON (BLACKBURNS)	10/12/1951 LFR	Level Flow Rainfall	15	22				5		12	12	11	4	6					1
420007	CASTLEREAGH RIVER AT BINNAMART	14/05/1965 LP	Level Flow	22	31						22	22	19	6	8					
420017	CASTLEREAGH RIVER AT HIDDEN VALLEY	25/02/2060 LPCT	Level Flow Conductivity Temperature	26	32	9	11				17	17	16	6	8	2	3			
420019	CASTLEREAGH RIVER AT ULAMAMBRI	13/05/1977 GQ	Gaugings and Ratings								13	13	12		5					
420020	CASTLEREAGH RIVER AT GUNGALMAN	10/05/2001 LPCT	Level Flow Conductivity Temperature	44	57	17	24				23	26	26	9	12	5	6			
420021	BELAR CREEK AT GRAHAM'S CROSSINGS	12/06/2001 GQ	Gaugings and Ratings									10	9							
420022	CASTLEREAGH RIVER AT COONABARABRAN NO 3	26/08/2010 LP	Level Flow	11	18						14	14	13	3	5					

Current storages

Nil

Potential Upgrades

Figure 89 - Castlereagh (420) potential upgrade sites

Basin- Site ID	Location	Current Monitoring (July 2020)	Request type (flow and storage levels)	Request reason - Summary	Request Status
42099999	Between the existing Gilgandra and Gungulman gauges.		Flow	To monitor lower Castlereagh flows	Proposed - Subject to further client consultation and review

Potential Downgrades

Figure 90 - Castlereagh (420) potential downgrade sites

STATION #	STNAME	COMMENCE	CURRENT PARAMETERS
420022	CASTLEREAGH RIVER AT COONABARABRAN NO 3	26/08/2010	Level Flow
420003	BELAR CREEK AT WARKTON (BLACKBURNS)	10/12/1951	Level Flow Rainfall

Macquarie (421)

Telemetry Sites

Figure 91 - Macquarie (421) showing telemetered gauging stations - Source WaterNSW website

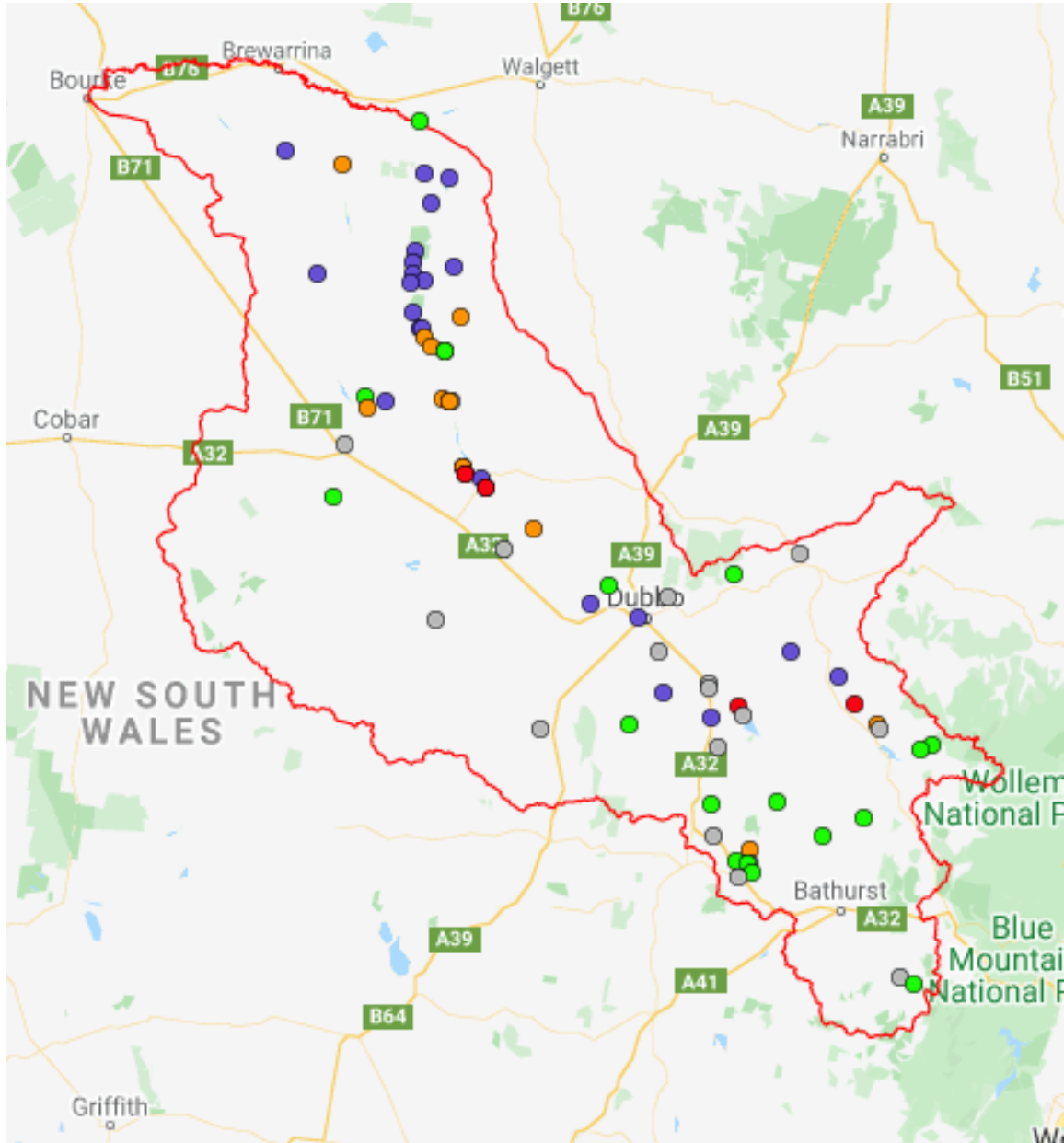


Figure 93 - Data Inventory Macquarie (421) gauging stations 2 of 2 - Source WaterNSW website

Station ID	FLOWS		HEIGHTS		RATINGS		NAME										Org. Net	Class	NAME
	Start	End	Start	End	First Starts	Last Starts	Last of Tab	No. of Tabs	No. of Gaug	att n p p	to u n p p	hou r b b	max r d d	Discout. n m y					
\$421158	01/01/1993	01/01/2017	11/06/1993	24/06/2020	01/01/1990	23/04/2019	55	12	136						DWR	SFP	BOGAN @ MONKEY BRID		
\$421164	01/01/1994	01/01/2016	22/09/1994	25/06/2020	22/09/1994	27/05/2020	85	17	102						DWR	SFP	DUCK CK @ NAPALI		
\$421165	01/01/1994	01/01/2017	22/09/1994	17/03/2020	22/09/1994	17/02/2020	85	20	133				T		DWR	SFP	BENITILLARDS CANONBA		
\$421166	* 01/01/1994	01/01/2017	22/09/1994	09/05/2018	01/01/1994	09/02/2020	95	18	120						DWR	SFP	GUNNINGBAR @ FVIEW		
\$421175			02/01/1998	16/02/2016											DWR	CH	GUNNINGBAR@WEIR STOR		
\$421176	01/01/2001	01/01/2005	25/10/2001	17/01/2020	25/10/2001	18/06/2020	15	2	10				T	C	DWR	CF	LITTLEBARHURVILLE #2		
\$421178			19/06/2002	26/02/2019	01/01/1990	01/01/1900	1	1				R			DWR	CF	MOLONG 80'S BORENOE		
\$421184	01/01/2009	01/01/2017	25/06/2009	03/06/2020	01/06/2009	29/02/2020	32	7	48						DWR	PFS	CUDGEGONGHILL A-STONE		
\$421185	01/01/2013	01/01/2017	07/05/2013	29/06/2020	16/06/2009	30/09/2019	122	5	40						DWR	CH	SUMMER HILL @ ICELY		
\$421186			03/11/2016	30/06/2020	16/06/2009	08/01/2019	120	5	23						DWR	CH	FLOUGHMANS DS MOLONG		
\$421188			28/09/2009	15/07/2020	28/09/2009	28/09/2009	100	1	46					B	DWR	PFS	DURMALOI @ SPILLWAY		
\$421189	* 01/01/2009	01/01/2017	30/11/2009	28/03/2020											DWR	XFR	CHEERON DAM		
\$421191	01/01/2011	01/01/2017	05/05/2011	11/06/2020	31/05/2011	31/05/2011	5	1	40				T	C	DWR	PFS	MACQUARIE@YARRACOOHA		
\$421192			05/08/2011	30/06/2020	21/02/2011	01/06/2016	120	3	55						DWR	SFP	MACO R DS LONGPOINT		
\$421194			10/05/2017	10/02/2020											DWR	CF	Talbragar @ Gulembul		
\$421195	01/01/2011	01/01/2101	19/05/2011	24/06/2020	19/05/2011	08/02/2020	10	4	37						DWR	CR	MONKEY CREEK DS ONLY		
\$421196													T	O	DWR		OUTFLOW DS STMA PARK		
\$421197	01/01/2014	01/01/2017	27/06/2013	30/06/2020	17/07/2013	03/05/2019	14	7	47						DWR	SFP	SHC @ 3RD KING BRDG		
\$421198													R	T	DWR	PI	DPI-ORANGE AMS		
\$421199			29/05/1980	29/05/1980											DWR	PI	DPI-TRANGIE AMS		
\$421900			25/02/1955	20/01/2020	01/01/1900	01/01/1900	1	1	1						DWR	CF	MACQUARIE @ WOLLONBI		
\$421903			20/01/1950	03/06/2020	23/08/2017	23/08/2017	1	1	9						DWR	SFS	Cudgong River @ Ry		
\$421904			31/08/2017	05/03/2020	31/08/2017	27/01/2020	15	3	9						DWR	SFS	TALBRAGAR @ DUNEDOO		
\$421907			04/01/1984	18/02/2020	27/04/2017	11/06/2020	15	4	20						DWR	FUI	Macquarie at Brewc		

Current gauging stations

Figure 94 - Macquarie (421) gauging stations 1 of 2 - Source WaterNSW website

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum of interested parties (1-5s)					DO	Flow regime importance where applicable			Interested parties above					Importance	
				Level	Flow	EC	Temp.	Rain		Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO	
421001	MACQUARIE RIVER AT DUBBO	01/06/1885 LF	Level Flow	27	42						17	24	23	5	8				
421004	MACQUARIE RIVER AT WARREN WEIR	01/01/1896 LF	Level Flow	28	40						17	19	18	6	9				
421005	GUNNINGHAM CREEK AT BELOW REGULATOR	01/12/1899 GQ	Gaugings and Ratings	26							17	19	18		7				
421011	MARTHAGUY CREEK AT CARINDA	16/04/1926 LFCT	Level Flow Conductivity Temperature	41	51	10	21				25	25	23	8	10	3	5		
421012	MACQUARIE RIVER AT CARINDA (BELLS BRIDGE)	15/04/1926 LFCT	Level Flow Conductivity Temperature	46	60	8	22				32	32	33	9	12	3	5		
421015	DUCK CREEK AT OFFTAKES	1/03/1936 GQ	Gaugings and Ratings	29							22	24	23		8				
421016	CROOKED CREEK AT PROFILE	1/03/1936 GQ	Gaugings and Ratings	36							22	24	23		9				
421017	GUNNINGHAM CREEK AT D/S WEIR	1/03/1936 GQ	Gaugings and Ratings	39							22	24	23		9				
421018	BELL RIVER AT NEWIRA	29/07/1939 LFCT	Level Flow Conductivity Temperature	33	39	10	20				25	24	23	8	11	3	5		
421019	CUDGONGS RIVER AT YAMBLE BRIDGE	2/08/1939 LFCT	Level Flow Conductivity Temperature	36	49	8	22				22	24	23	8	11	3	5		
421022	MACQUARIE RIVER AT OXLEY STATION	1/01/1941 LF	Level Flow	42	55						32	34	33	8	11				
421023	BOGAN RIVER AT GONGGONG	2/11/1945 LFCT	Level Flow Conductivity Temperature	48	58	13	19				28	31	32	9	11	4	5		
421026	TURON RIVER AT SOPALA	1/09/1949 LFCT	Level Flow Conductivity Temperature	30	41	10	20				20	20	17	7	9	3	5		
421031	MACQUARIE RIVER AT GIN GIN	29/07/1954 LF	Level Flow	27	40						22	24	23	6	9				
421039	BOGAN RIVER AT NEURIE PLAINS	21/05/1959 LFCT	Level Flow Conductivity Temperature	27	37	5	6				21	23	22	6	9	1	2		
421040	MACQUARIE RIVER AT DOWNSTREAM BURRENDONG DAM	3/03/1960 LFCT	Level Flow Conductivity Temperature	36	56	12	22				29	29	26	8	11	4	5		
421042	TALBRAGGAR RIVER AT ELONG ELONG	10/11/1964 LF	Level Flow	28	36						17	19	18	6	9				
421048	LITTLE RIVER AT OXLEY NO.2	9/07/1965 LFCT	Level Flow Conductivity Temperature	27	37	9	16				17	19	18	6	9	3	4		
421050	BELL RIVER AT MOLONG	14/07/1965 LF	Level Flow	16	20						15	15	14	4	6				
421051	Blackmans Swamp Creek at Near Orange	14/07/1965 LF	Level Flow	9	12						8	8	7	3	4				
421055	COOLAGGIE CREEK AT RAWSONVILLE	10/12/1965 LF	Level Flow	22	35						17	19	16	5	8				
421079	CUDGONG RIVER AT D/S WINDAMERE DAM	26/02/1970 LFCT	Level Flow Conductivity Temperature	27	38	10	16				14	14	13	6	9	3	4		
421086	MAREBONE BREAK AT D/S MAREBONE REGULATOR	18/08/1975 LF	Level Flow	23	39						17	19	18	4	8				
421090	MACQUARIE RIVER AT D/S MAREBONE WEIR	17/09/1976 LFCT	Level Flow Conductivity Temperature	31	49	13	14				22	24	23	6	10	3	4		
421097	MARRA CREEK AT CARINDA ROAD	6/10/1975 LF	Level Flow	22	29						15	15	14	5	7				
421107	MARRA CREEK AT BULLYBONGONE BRIDGE	26/06/1980 LFCT	Level Flow Conductivity Temperature	30	42	13	14				21	23	22	6	9	3	4		
421116	MACQUARIE RIVER AT GIBSON WAY	7/09/1980 LF	Level Flow	23	30						19	19	18	5	7				
421118	BULGERAGA CREEK AT GIBSON WAY	1/01/1980 LF	Level Flow	18	25						14	14	13	4	6				
421127	MACQUARIE RIVER AT BAREEDNA	17/05/1982 LFCT	Level Flow Conductivity Temperature	34	45	10	19				17	19	18	7	10	3	4		
421132	MONKEYS CREEK AT D/S GIBSON WAY	4/04/1979 LF	Level Flow	18	28						17	17	16	4	7				
421135	MACQUARIE RIVER AT MILTARA	1/01/1982 LF	Level Flow	34	47						25	25	24	6	9				
421137	MACQUARIE RIVER AT D/S THE WILLOWS	26/10/1982 GQ	Gaugings and Ratings	17							15	15	14		5				
421144	OXLEY BREAK NO. 3 AT OFFTAKES	31/05/1985 LF	Level Flow	24	31						20	20	19	5	7				
421145	BULGERAGA CREEK AT BIFURCATION	6/07/1979 LF	Level Flow	27	34						20	20	19	5	7				
421146	GUM COWAL AT BIFURCATION	1/09/1987 LF	Level Flow	33	41						20	20	19	6	8				
421147	MACQUARIE RIVER AT PILICAWARRINA	23/06/1987 LF	Level Flow	33	44						22	24	23	6	9				
421149	CUDGONG RIVER AT ROCKY WATER HOLE	24/07/1985 LF	Level Flow	27	45						27	29	28	6	10				
421150	CUDGONG RIVER AT WILBERTREE ROAD	17/05/1985 LF	Level Flow	22	33						17	19	18	5	8				
421151	BORA CHANNEL AT OFFTAKES	23/06/1987 LF	Level Flow	17	21						13	13	12	4	5				
421152	GUM COWAL AT OXLEY	3/09/1987 LF	Level Flow	26	34						23	23	22	6	8				
421153	TERBRIALL CREEK AT U/S MARTHAGUY CREEK	9/09/1987 LF	Level Flow	22	29						15	15	14	4	6				
421156	BOGAN RIVER AT MONKEY BRIDGE	19/05/1993 LF	Level Flow	24	33						23	23	22	6	8				
421164	DUCK CREEK AT NAPALI	22/09/1994 LF	Level Flow	21	31						17	19	18	5	8				
421165	BENI BILLA CREEK AT DOWNSTREAM CANONBA ROAD	23/09/1994 LF	Level Flow	15	20						15	15	14	4	6				
421166	GUNNINGHAM CREEK AT FAIRVIEW DAM	22/09/1994 LF	Level Flow	18	27						17	19	18	4	7				

Figure 95 - Macquarie (421) gauging stations 2 of 2 - Source WaterNSW website

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum of interested parties (1-5s)					DO	Flow regime importance where applicable			Interested parties above					Importance	
				Level	Flow	EC	Temp.	Rain		Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO	
421170	MOLONG CREEK AT DOWNSTREAM BORENORE CREEK	18/02/2002 LR	Level Rainfall	34					5		15	15	14	4					
421180	BELL RIVER AT TANTALLON ROAD	9/02/2005 GQ	Gaugings and Ratings		10						15	15	14		3				
421184	CUDGONG RIVER AT UPSTREAM RYLLSTONE	25/06/2009 LF	Level Flow	24	33						19	19	18	6	8				
421185	Summer Hill Creek at Tooley Road	16/06/2009 LF	Level Flow	14	22						16	16	15	5	7				
421186	Ploughmans Creek at Downstream Molong Road	16/06/2009 LF	Level Flow	30	14						12	12	11	4	5				
421187	FISH RIVER AT UPSTREAM OBERON DAM	19/10/2009 GQ	Gaugings and Ratings								20	20	19						
421188	DUCKMALLOW RIVER AT WEIR SPILLWAY	24/09/2009 LF	Level Flow	23	33						25	25	24	6	8				
421193	MACQUARIE RIVER AT YARRACOONA	31/05/2011 LFCT	Level Flow Conductivity Temperature	30	40	9	15				20	20	19	7	9	3	3		
421192	MACQUARIE RIVER DOWNSTREAM LONG POINT	1/06/2011 LF	Level Flow	20	30						20	20	19	5	7				
421196	MONKEY CREEK @ DS OXLEY STATION	19/05/2011 LF	Level Flow	20	29						19	19	18	5	7				
421196	Outflow Downstream of Sums Park Dam	4/01/2017 LFDT	Level Flow DO Temp	12	19		0		4		13	13	12	4	6		0	6	
421197	Summer Hill Creek at Third Crossing Bridge	27/06/2013 LF	Level Flow	12	19						13	13	12	4	6				
421903	CUDGONG RIVER AT RYLLSTONE	24/08/2017 LF	Level Flow	27	34						19	19	18	6	8				
421904	TALBRAGGAR RIVER AT DUNDOD	31/06/2017 LF	Level Flow	19	25						20	20	19	5	7				
421907	Macquarie River at Brewton Bridge	2/05/2017 LF	Level Flow	26	35						20	20	19	5	7				

Current storages

Figure 96 - Macquarie (421) storages

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO
421078	MACQUARIE RIVER AT BURRENDONG DAM - STORAGE GAUGE	1/06/1967 M	Level Volume Rain	17	40				5		10	10	10	4	9			1
421148	CUDGONG RIVER AT WINDAMERE DAM-STORAGE GAUGE	25/02/1966 L	Level Volume Rain	17	40				5		10	10	10	4	9			1
421189	FISH RIVER AT OBERON DAM - STORAGE GAUGE	28/09/2009 M	Level Volume Rain	12	32				6		5	5	5	2	7			6

Potential Upgrades

Figure 97 - Macquarie (421) potential upgrade sites

Basin- Site ID	Location	Current Monitoring (July 2020)	Request type (flow and storage levels)	Request reason - Summary	Request Status
421012	Macquarie River at Carinda (Bells Bridge)	Level Flow Cond. Temp.		Improved technology to increase accuracy	Proposed - Subject to further client consultation and review
421138	Bogan River at Nyngan	Level	Flow	For WSP to implement Commence to Pump	Proposed - Subject to further client consultation and review
421138	Nyngan Lower weir pool	Level	Level	Move Orifice	Proposed - Subject to further client consultation and review
421153	Terrigal at u/s Marthaguy Ck	Level Flow	Level Flow	Confirm Flow Data Reliability	Proposed - Subject to further client consultation and review
421153	Terrigal Creek at u/s Marthaguy Creek	Level Flow	Level Flow	Upgrade to increase Flow data reliability	Proposed - Subject to further client consultation and review
42199999	Marthaguy Ck at u/s Terrigal Ck		Flow	To monitor WSP Active and Environmental Flow Management	Proposed - Subject to further client consultation and review
42199999	Marthaguy Creek at u/s confluence with Terrigal Creek		Flow	To better monitor environmental flows in the Macquarie	Proposed - Subject to further client consultation and review
42199999	Milmiland Creek at Carinda Road		Flow	To manage environmental water	Proposed - Subject to further client consultation and review
42199999	Tyreel and Mallowa regulators		Flow	Potential relocation of sites.	Proposed - Subject to further client consultation and review

Potential Downgrades

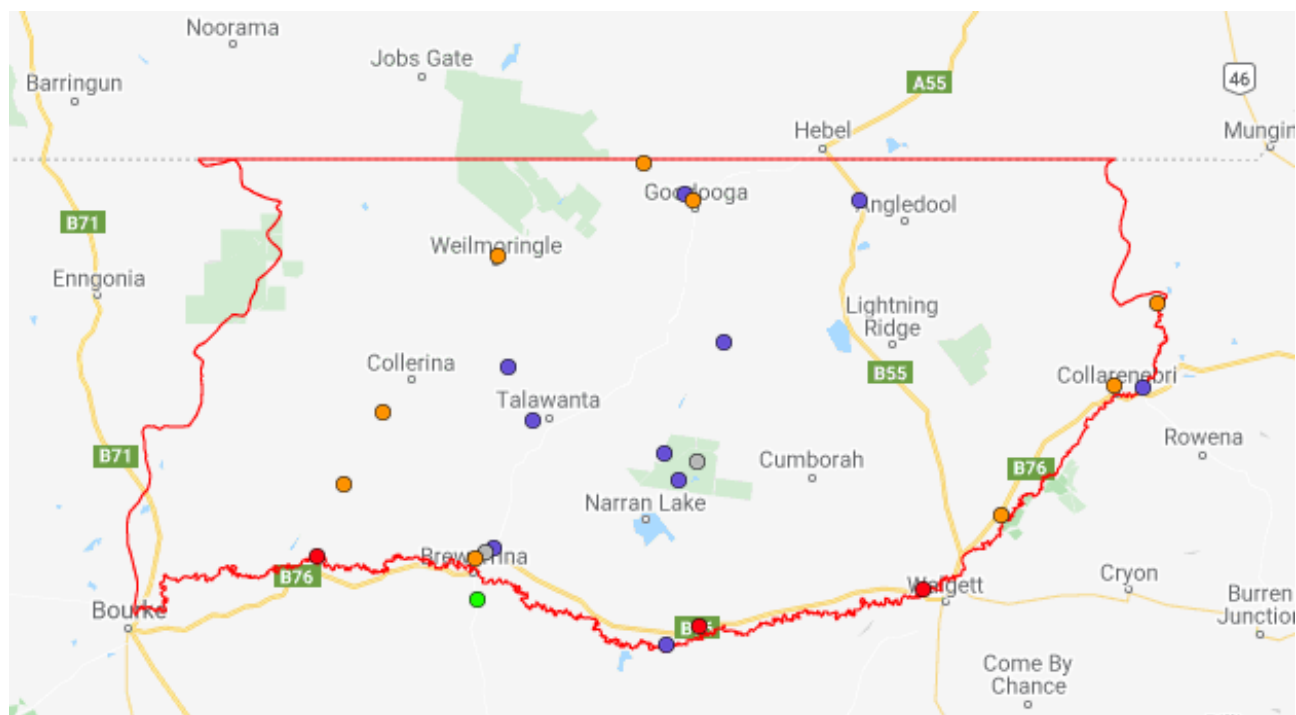
Figure 98 - Macquarie (421) potential downgrade sites

STATION #	STNAME	COMMENCE	CURRENT PARAMETERS
421180	BELL RIVER AT TANTALLON ROAD	9/02/2005	Gaugings and Ratings
421051	Blackmans Swamp Creek at Near Orange	14/07/1965	Level Flow
421186	Ploughmans Creek at Downstream Molong Road	16/06/2009	Level Flow
421197	Summer Hill Creek at Third Crossing Bridge	27/06/2013	Level Flow
421165	BENI BILLA CREEK AT DOWNSTREAM CANONBA ROAD	23/09/1994	Level Flow
421151	BORA CHANNEL AT OFFTAKE	23/06/1987	Level Flow
421185	Summer Hill Creek at Icely Road	16/06/2009	Level Flow
421050	BELL RIVER AT MOLONG	14/07/1965	Level Flow

Culgoa (422)

Telemetry Sites

Figure 99 - NSW extent of Culgoa (422) showing telemetered gauging stations - Source WaterNSW website



Data Inventory

Figure 100 - Data Inventory Culgoa (422) gauging stations - Source WaterNSW website

SURFACE_WATER Archive Data Inventory for 422-Culgoa River Basin														
S=Telemetered *=Storage														
Station ID	FLOWS		HEIGHTS		RATINGS		No. of	No. of	R	A	W	C	T	W H O
	Start	End	Start	End	First Starts	Last Starts	Last of Tab	of Tabs	at n p	tt m n	ou r p	i u x	Discont.	Org. Net
														Code Class
														NAME
\$422001	01/01/1886	01/01/2017	10/06/1886	09/06/2020	01/08/1885	15/02/2020	167	42	572	T	C		O	DWR SFP BARWON @ DANGAR EDGE
\$422002	01/01/1892	01/01/2101	18/04/1890	10/06/2020	11/02/1892	19/06/2020	141	34	529	T	C		O	DWR SFP BARWON @ BREWARRINA
\$422003	01/01/1944	01/01/2017	01/08/1921	17/06/2020	01/07/1974	29/11/2014	122	15	526	T	C			DWR SFP BARWON @ COLLARENEBRI
\$422004	01/01/1944	01/01/2017	24/01/1891	11/02/2020	10/06/1890	02/04/2011	117	14	399					DWR SFP BARWON @ MOGIL MOGIL
\$422005	01/01/1944	01/01/2019	02/10/1944	19/05/2020	06/09/1944	01/05/2018	111	20	289	R				DWR SFP BOKHARA @ BOKHARA
\$422006	01/01/1944	01/01/2019	07/09/1944	05/05/2020	01/09/1944	25/03/2018	157	37	284					DWR SFP CULGOA@S COLLERINA
\$422007	01/01/1947	01/01/2017	01/07/1983	10/06/2020	29/06/1983	01/02/2019	229	10	304					DWR SFP CATO CK @ BREWARRINA
\$422010	01/01/1964	01/01/2017	01/10/1964	19/05/2020	01/10/1964	18/02/2015	44	14	188					DWR SFP BIRRIE @ TALAWANTA
\$422011	01/01/1964	01/01/2019	09/12/1964	05/05/2020	09/12/1964	05/05/2019	66	26	246					DWR SFP CULGOA@S COLLERINA
\$422013	01/01/1964	01/01/2019	29/10/1964	16/01/2020	29/01/1964	01/01/2018	75	27	268					DWR SFP BIRRIE@NEAR GOODDOGA
\$422015	01/01/1960	01/01/2019	01/04/1960	16/01/2020	01/01/1960	01/04/2017	132	35	273	T	C			DWR SFS CULGOA @ BRENDA
\$422016	01/01/1964	01/01/2019	11/11/1964	12/03/2020	01/01/1960	20/02/2016	58	18	192	R	T			DWR SFS NARRAN @ WILBY WILBY
\$422017	01/01/1964	01/01/2019	15/08/1965	20/05/2020	01/01/1960	26/02/2012	53	13	225					DWR SFS CULGOA @WEILMORINGLE
\$422018	01/01/1965	01/01/2017	03/09/1980	24/07/2019	19/06/1965	01/01/2003	102	6	266					DWR SFP GRAWAN@OLDPOCKATAROO
\$422022	01/01/1930	01/01/2017	25/11/1985	10/06/2020	02/01/1900	23/02/2012	107	4	117					DWR SFP TARRION CK @ BREWARRINA
\$422023	01/01/1948	01/01/2004			01/01/1974	15/03/2016	210	8	28					DWR SFP BREWARRINA TOTAL FL
\$422025	01/01/1999	01/01/2017	30/06/1999	11/06/2020	01/01/1999	14/02/2020	13	13	150					DWR SFP BARWON @ TARA
\$422026	01/01/1999	01/01/2017	29/06/1999	10/06/2020	01/01/1999	01/10/2018	13	13	156					DWR SFP BARWON @ BOOROOMA
\$422027	01/01/1999	01/01/2017	29/06/1999	11/06/2020	01/03/1999	21/06/2019	12	12	163	T	C		O	DWR SFP BARWON @ GEERA
\$422028	01/01/1999	01/01/2017	26/06/1999	18/05/2020	26/06/1999	22/07/2019	13	13	134					DWR SFP BARWON @ BEEMERY
\$422029	01/01/2002	01/01/2018	14/02/2002	04/12/2019	14/02/2002	23/04/2017	5	5	116	T	C			DWR SFS NARRAN @ NARRAN PARK
\$422030	01/01/2002	01/01/2019	11/04/2002	21/04/2020	11/04/2002	01/04/2017	7	6	122	T	C			DWR SFP NARRAN @ ANGLEDOOL 2
\$422031	01/01/2008	01/01/2017	30/04/2008	04/12/2019	31/03/2008	12/10/2016	5	5	54	R	T			DWR SFI NARRAN @ BUNDAB
\$422032	01/01/2009	01/01/2019	09/12/2009	12/03/2020	09/12/2009	11/03/2020	2	2	66					DWR SFS BOKHARA @ U/S WEIR
\$422034			02/02/2010	04/12/2019						R	T	T		DWR SFI Narran R @ Back Lake

Current gauging stations

Figure 101 - Culgoa (422) current gauging stations

STATION #	STNAME	COMMENT CODE	CURRENT PARAMETERS	Sum of interested parties (1-5)					DO	Flow regime importance where applicable			Interested parties above					Importance	DO
				Level	Flow	EC	Temp.	Rain		Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain		
422001	BARWON RIVER AT DANGAR BRIDGE (WALGETT)	01/01/1886 LFCT	Level Flow Conductivity Temperature	52	72	15	20						34	39	38				
422002	BARWON RIVER AT BREWARRINA	17/04/1892 LFCT	Level Flow Conductivity Temperature	49	67	10	15						29	34	33				
422003	BARWON RIVER AT COLLARENEBRI MAIN CHANNEL	03/06/1889 LFCT	Level Flow Conductivity Temperature	52	71	13	18						34	39	38				
422004	BARWON RIVER AT MOGLI MOGLI	1/10/1938 LF	Level Flow	37	53								29	34	33				
422005	BOOHARA RIVER AT BOOHARA (GOODWINS)	6/09/1944 LFR	Level Flow Rainfall	33	50			18					25	34	33				
422006	CULGOA RIVER AT D/S COLLARINA (KENEBREE)	7/09/1944 LF	Level Flow	30	47								20	29	28				
422007	CATO CREEK AT BREWARRINA	7/11/1947 LF	Level Flow	9	23								10	14	13				
422010	BIRRIE RIVER AT TALAWANTA	26/10/1964 LF	Level Flow	18	28								14	18	17				
422011	CULGOA RIVER AT U/S COLLARINA (MUNDIWA)	27/10/1964 LF	Level Flow	24	40								19	23	22				
422013	BIRRIE RIVER AT NEAR GOODGOOGA	29/10/1964 LF	Level Flow	29	40								14	23	22				
422015	CULGOA RIVER AT BRENDA	1/03/1926 LFCT	Level Flow Conductivity Temperature	39	53	15	20						24	33	32				
422016	NARRAN RIVER AT WILBY WILBY (BELVEDERE)	2/11/1964 LFCTR	Level Flow Conductivity Temp Rain	24	36	5		12					22	27	26				
422017	CULGOA RIVER AT WELLMORINGIE	3/11/1964 LF	Level Flow	34	35								14	23	22				
422018	GRAWAN CREEK AT OLD POKATAROO	19/06/1965 LF	Level Flow	14	28								10	14	13				
422022	TARRON CREEK AT NEAR BREWARRINA	30/07/1985 LF	Level Flow	9	23								9	13	12				
422023	BARWON RIVER AT BREWARRINA TOTAL FLOW	17/04/1892 LF	Level Flow	22	37								20	24	23				
422025	BARWON RIVER AT TARA (UPSTREAM NAMOI JUNCTION)	30/06/1999 LF	Level Flow	27	43								29	29	28				
422026	BARWON RIVER AT BOOROOMA (UPSTREAM MACQUARIE JUNC)	29/06/1999 LF	Level Flow	33	49								29	29	28				
422027	BARWON RIVER AT GERA (DOWNSTREAM MACQUARIE JUNC)	29/06/1999 LFCT	Level Flow Conductivity Temperature	46	63	13	18						34	34	33				
422028	BARWON RIVER AT BEEMERY (U/S CULGOA JUNCTION)	26/06/1999 LF	Level Flow	35	53								34	34	33				
422029	NARRAN RIVER AT NARRAN PARK	14/02/2002 LFCT	Level Flow Conductivity Temperature	34	51	10	10						24	31	30				
422030	NARRAN RIVER AT NEW ANGLEDWOOD NO. 2	11/04/2002 LFCT	Level Flow Conductivity Temperature	38	55	15	20						29	33	30				
422031	NARRAN RIVER @ BUNDAGH	31/03/2008 LFCTR	Level Flow Conductivity Temp Rain	29	46	10		14					20	29	28				
422032	BOOHARA RIVER AT U/S GOODGOOGA WEIR	9/12/2009 LF	Level Flow	28	44								24	28	27				
422034	NARRAN RIVER @ BACK LAKE	10/12/2009 LFCTR	Level Flow Conductivity Temp Rain	22	40	10	10	14					15	20	19				

Current storages

Nil

Potential Upgrades

Nil

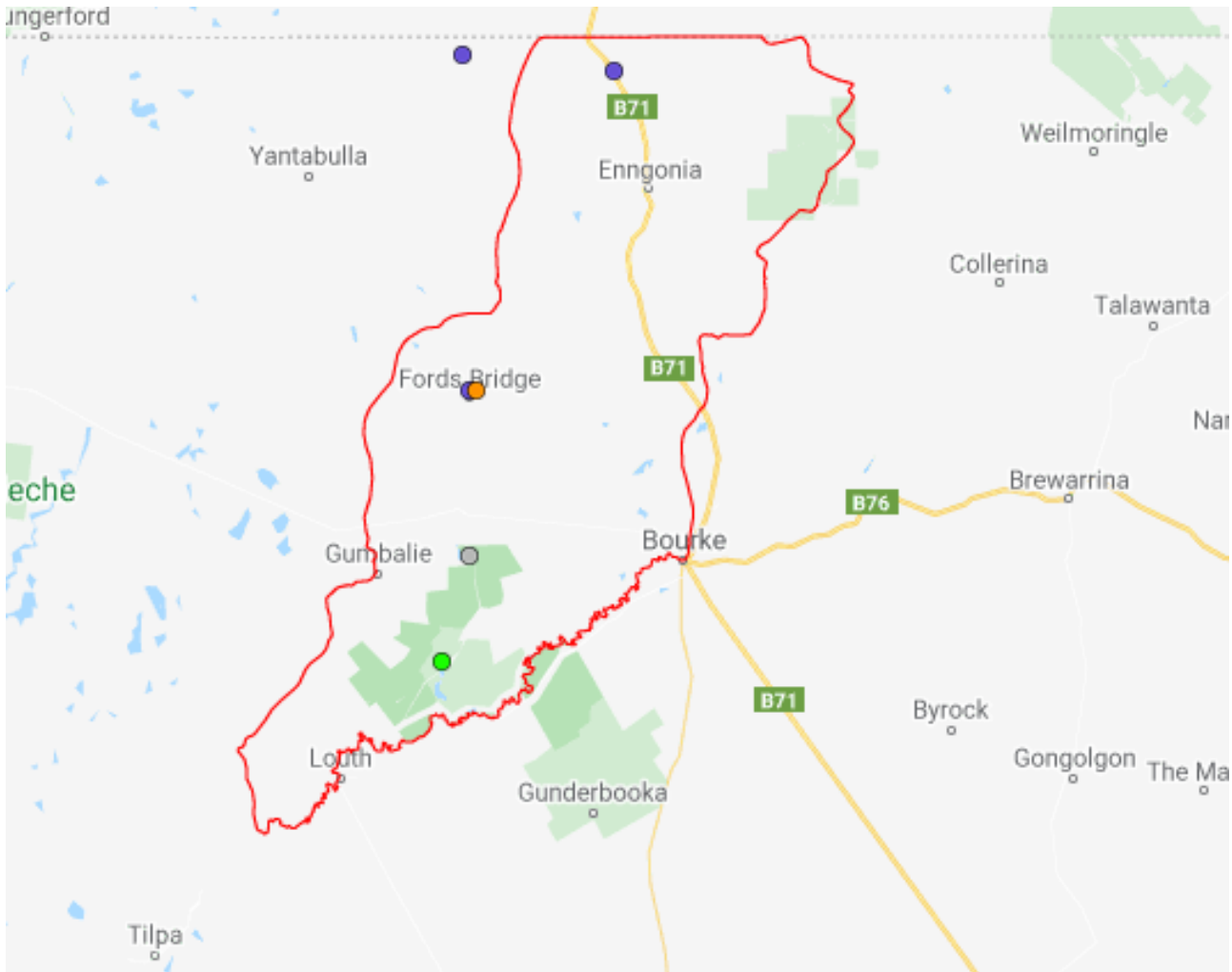
Potential Downgrades

Nil

Warrego (423)

Telemetry Sites

Figure 102 - NSW extent of Warrego (423) showing telemetered gauging stations - Source WaterNSW website



Data Inventory

Figure 103 - Data Inventory Warrego (423) gauging stations - Source WaterNSW website

SURFACE_WATER Archive Data Inventory for 423-Warrego River Basin														
S=Telemetered														
*=Storage														
Station ID	FLOWS		HEIGHTS		RATINGS		No. of		RAWCT		WHO		Org. Code	NAME
	Start	End	Start	End	First Starts	Last Starts	Last Tab	of Tabs	at	to	ix	Discont.		
\$423001	01/01/1921	01/01/2019	01/12/1921	19/05/2020	01/01/1900	24/04/2016	152	16	231				DWR	FPS
\$423002	01/01/1921	01/01/2019	01/12/1921	28/05/2020	01/01/1900	01/10/2017	179	20	267	T	C		DWR	FPS
\$423004	01/01/1993	01/01/2017	30/05/1993	15/01/2020	30/05/1993	08/03/2020	13	9	136	T	C		DWR	FPS
\$423005	01/01/1993	01/01/2017	31/05/1993	15/01/2020	31/05/1993	14/03/2010	7	3	113	T	C		DWR	FPS
\$423007	01/01/2012	01/01/2017	04/12/2012	28/05/2020	04/12/2012	02/11/2019	25	6	46				DWR	SFS
\$423008			05/12/2012	09/04/2020									DWR	SFS

Current gauging stations

Figure 104 - Warrego (423) current gauging stations

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum of interested parties (1-5)						Flow regime importance where applicable			Interested parties above						Importance	
				level	Flow	EC	Temp.	Rain	DO	Low flow	Medium flow	High flow	level	Flow	EC	Temp.	Rain	DO		
423001	WARREGO RIVER AT FORDS BRIDGE (MAIN CHANNEL)	29/11/1921 LF	Level Flow	33	52					28	32	29	7	11						
423002	WARREGO RIVER AT FORDS BRIDGE BYWASH	29/11/1921 LFCT	Level Flow Conductivity Temperature	45	64	13	18			25	34	31	8	12	4	4				
423004	WARREGO RIVER AT BARRINGUN No. 2	30/05/1993 LFCT	Level Flow Conductivity Temperature	42	59	10	15			24	33	22	8	12	3	3				
423005	CUTTABURRA CHANNEL AT TURRA	31/05/1993 LFCT	Level Flow Conductivity Temperature	28	44	5	10			14	18	17	6	10	2	2				
423007	WARREGO RIVER AT DICKS DAM	27/02/2013 LF	Level Flow	22	39					15	19	18	4	8						

Current storages

Nil

Potential Upgrades

Figure 105 - Warrego (423) potential upgrade sites

Basin- Site ID	Location	Current Monitoring (July 2020)	Request type (flow and storage levels)	Request reason - Summary	Request Status
423008	Warrego River at Boera Dam	Level	Flow	To better monitor flows on the Warrego (near Toorale)	Proposed - Subject to further client consultation and review

Potential Downgrades

Nil

Paroo (424)

Telemetry Sites

Figure 106 - NSW extent of Paroo (424) showing telemetered gauging stations - Source WaterNSW website



Data Inventory

Figure 107 - Data Inventory Paroo (424) gauging stations

SURFACE_WATER Archive Data Inventory for 424-Paroo River Basin														
\$=Telemetered														
*=Storage														
Station ID	FLOWS		HEIGHTS		RAINGS		No. of		RAWCT		WHO		Org. Net	NAME
	Start	End	Start	End	First Starts	Last Starts	Last Tab	of Tab	at	to	u	ix		
													Code	Class
\$424002	01/01/1975	01/01/2019	30/03/1976	19/05/2020	22/11/1975	05/05/2019	142	7	183				DWR	FPS
														PAROO @ WILLARA KING

Current gauging stations

Figure 108 - Paroo (424) current gauging stations

STATION #	STNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum of interested parties (1-5s)						Flow regime importance where applicable			Interested parties above						If importance	
				Level	Flow	EC	Temp.	Rain	DO	Low flow	Medium flow	High flow	Level	Flow	EC	Temp.	Rain	DO		
424002	PAROO RIVER AT WILLARA CROSSING	23/11/1975 LF	Level Flow	38	57					20	29	26	7	11						
424003	PAROO RIVER AT PORTERS CROSSING	25/01/2010 LF	Level Flow	20	35					20	24	23	5	8						

Current storages

Nil

Potential Upgrades

Nil

Potential Downgrades

Nil

Darling (425)

Telemetry Sites

Figure 109 - Map 21 Darling (425) showing telemetered gauging stations - Source WaterNSW website



Data Inventory

Figure 110 - Data Inventory Darling (425) gauging stations - Source WaterNSW website

SURFACE WATER Archive Data Inventory for 425-Darling River Basin																			
S=Telemetered **=Storage																			
Station ID	FLOWS		HEIGHTS		RATINGS		No. of		RAWCT		WHO		Discont.	Org.	Net	NAME			
	Start	End	Start	End	First Starts	Last Starts	Last Tab	No. of	Tab	of	im	n	r	p	n	y	Date	Code	Class
425001	01/01/1881	01/01/2017	01/01/1881	30/06/2020										DWR	CH	DARLING@MENINDEE TWN			
425003	01/01/1880	01/01/2017	18/03/1864	21/05/2020	21/09/1830	03/12/2011	301	51	617		T	C	O	DWR	SFP	DARLING@BOURKE TOWN			
425004	01/01/1904	01/01/2016	24/04/1890	08/04/2020	23/05/1900	01/11/2019	50	12	353		T	C		DWR	SFS	DARLING@LOUTH			
425005	01/01/1913	01/01/2013	11/12/1879	17/11/1998	01/01/1900	21/11/2018	160	17	138		T	C	B	DWR	SFFR	DARLING@POONCARIE			
425007	01/01/1940	01/01/2017	25/03/1940	05/05/2020	01/01/1900	11/04/2020	204	56	475		T	C	B	O	DWR	SFP	DARLING@BURLUNDY		
425008	01/01/1913	01/01/2017	01/08/1932	24/06/2020	01/01/1900	05/03/2020	226	35	599		T	C		DWR	SFP	DARLING@WILC. MAIN C			
425010	01/01/1951	01/01/2009	01/01/1870	31/03/2008	15/05/1950	16/08/1982	120	2	245					DWR	SFS	MURRAY@LLO WENTWORTH			
425011	01/01/1954	01/01/2016	30/11/1954	18/06/2020	01/01/1900	19/07/2017	175	20	170		T	C		DWR	SFP	DARL ANABR@BULPUNGA			
425012	01/01/1959	01/01/2017	20/02/1974	26/06/2020	01/01/1900	20/03/2020	260	34	566		T	C		DWR	SFS	DARLING@U/S WEIR 32			
425013	01/01/1962	01/01/2017	31/05/1971	23/06/2020	02/04/1971	03/03/2017	202	18	176		T	C		DWR	SFS	DARLING ANABR@WYCOT			
425014	01/01/1992	01/01/2016	15/06/1992	23/06/2020	02/05/1986	02/03/2017	160	9	167		T	C		DWR	SFS	L CAMNDILLA@OUTLET			
425018	01/01/1971	01/01/2017	01/03/1981	24/06/2020	28/02/1981	02/02/2010	112	5	37					DWR	SFP	TAIYAWA@KA@BARR HW			
425019	01/01/1962	01/01/2012	30/03/1962	23/06/2020	01/01/1900	09/10/2017	160	23	140		T	C		DWR	SFS	REDBANK@D/S PACKERS			
425022	*		01/07/1968	25/06/2020	01/01/1987	01/01/1987	100	1						DWR	SFH	LAKE MENINDEE			
425023	*		01/05/1979	23/06/2020	01/01/1987	01/01/1987	100	1						DWR	SFH	LAKE CAMNDILLA			
425034			28/07/2010	25/06/2020					6					DWR	CH	DARLING@DS MEND WEIR			
425035			01/05/1992	27/02/2020	01/05/1992	14/02/2014	10	3	38		T	C		DWR	PJI	DARLING@DS DEADHORSE			
425036	01/01/1992	01/01/2010	30/04/1992	27/02/2020	01/01/1900	22/04/2019	20	5	35		T	C		DWR	PJI	DARLING@GLEN VILLA			
425037	01/01/2002	01/01/2017	16/05/2002	27/02/2020	01/01/1901	22/04/2019	25	8	52		T	C		DWR	PJI	DARLING@D/S WEIR 19A			
425038	01/01/1992	01/01/2012	03/05/1992	27/02/2020	14/05/2002	17/06/2016	15	3	25		T	C		DWR	PJI	DARLING@MYANDETTA			
425039	01/01/1999	01/01/2017	27/06/1999	03/12/2019	27/06/1999	09/05/2019	9	9	130		T	C		DWR	SFP	DARLING@WARRAWEENA			
425044			09/06/2010	25/06/2020					65					DWR	SFFR	MENINDEE@OUTLET CH			
425046														DWR		L WETHERELL@STORAGE			
425047														DWR		L TANDURE@STORAGE			
425048	01/01/2009	01/01/2017	07/09/2009	23/06/2020	06/09/2009	01/04/2020	9	8	47					DWR	CR	DARLING@ANABRANCH			
425049														DWR	SFS	MENINDEE TOTAL			
425050	01/01/2009	01/01/2015	07/09/2009	23/06/2020	07/09/2009	07/09/2009	1	1	20					DWR	CH	ANABRANCH@OFFTAKE			
425052			28/10/2013	11/06/2020										DWR	PJI	ANABRANCH U/S 183			
425053	01/01/2013	01/01/2017	28/10/2013	18/06/2020	28/10/2013	31/03/2017	12	2	26					DWR	PJI	ANABRANCH D/S 183			
425054	01/01/2013	01/01/2014	14/11/2013	18/06/2020	14/11/2013	29/05/2017	15	5	22					DWR	PJI	ANABRANCH AT TARA DO			
425056			05/07/2018	15/04/2020										DWR	SFH	DARLING @ ASHVALE			
425057			04/07/2018	15/04/2020										DWR	SFH	DARLING @ JAMESVILLE			
425058			07/02/2020	24/06/2020										DWR		Darling R @ Moorabin			
42510036														DWR	SFH	LAKE PAMMAROO			
42510037														DWR	SFFR	MENINDEE@COPI HOLLOW			

Current gauging stations

Figure 111 - Darling (425) current gauging stations

STATION #	SYNNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum or interested parties (1-3)						Flow regime importance where applicable			Interested parties above					
				Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO
425001	DARLING RIVER AT BOURKE TOWN	01/02/1881 LCT	Level Flow Conductivity Temperature	52	72	15	20			30	35	30	9	13	4	4		
425004	DARLING RIVER AT LOUTH	1/02/1940 LCT	Level Flow Conductivity Temperature	52	72	15	20			30	35	35	9	13	4	4		
425005	DARLING RIVER AT POONCARIE	01/03/1885 LCT	Level Flow Conductivity Temperature	42	56	10	20			24	29	29	8	11	4	4		
425007	DARLING RIVER AT BURLUNDY	25/03/1940 LCT	Level Flow EC DO	37	61	13	23		18	27	34	32	7	12	5	5		4
425008	DARLING RIVER AT WILCANINNA MAIN CHANNEL	27/10/1886 LCT	Level Flow Conductivity Temperature	42	67	13	23			32	39	39	8	13	5	5		
425010	MURRAY RIVER AT LOCK NO. 10 (WENTWORTH)	01/06/1872 LF	Level Flow	29	42					20	25	25	5	8				
425011	GREAT DARLING ANABRANCH AT BULPUNGA	30/11/1954 LCT	Level Flow Conductivity Temperature	24	41	15	15			20	20	20	5	9	3	3		
425012	DARLING RIVER AT GLEN VILLA	19/02/1958 LCT	Level Flow Conductivity Temperature	34	57	15	20			22	24	24	7	12	4	4		
425013	GREAT DARLING ANABRANCH AT WYCOT	2/06/1962 LCT	Level Flow Conductivity Temperature	24	44	15	15			20	22	22	5	10	1	1		
425014	OUTLET CHANNEL AT LAKE CAMNDILLA	11/05/1960 LCT	Level Flow Conductivity Temperature	24	44	15	20			22	24	23	5	10	4	4		
425018	TAIYAWA CREEK AT BARRIER HIGHWAY (WILCANINNA)	1/01/1971 LF	Level Flow	25	43	12	17			22	29	28	6	10	4	4		
425019	REDBANK CREEK AT DOWNSTREAM PACKERS CROSSING	30/03/1962 LCT	Level Flow Conductivity Temperature	21	41	12	17			22	23	21	5	10	4	4		
425035	DARLING RIVER AT DOWNSTREAM DEAD HORSE CREEK	1/05/1992 LCT	Level Flow Conductivity Temperature	22	34	5	5			9	9	9	4	7	1	1		
425036	DARLING RIVER AT GLEN VILLA	30/04/1992 LCT	Level Flow Conductivity Temperature	18	30	9	9			10	9	9	4	7	2	2		
425037	DARLING RIVER AT DOWNSTREAM WEIR 19A	3/05/1992 LCT	Level Flow Conductivity Temperature	18	31	5	5			9	9	9	4	7	1	1		
425038	DARLING RIVER AT MYANDETTA	3/05/1992 LCT	Level Flow Conductivity Temperature	19	31	5	5			5	5	5	4	7	1	1		
425039	DARLING RIVER AT WARRAWEENA (D/S CULGOJA JUNCTION)	27/06/1999 LCT	Level Flow Conductivity Temperature	43	60	10	15			30	30	29	8	12	3	3		
425048	DARLING RIVER AT GREAT DARLING ANABRANCH OFFTAKE	7/09/2009 LF	Level Flow	27	45					26	28	28	6	10				
425050	GREAT DARLING ANABRANCH AT OFFTAKE	7/09/2009 LF	Level Flow	22	36					20	20	20	5	8				
425053	GREAT DARLING ANABRANCH DOWNSTREAM DAM 183	28/10/2013 LF	Level Flow	22	36					20	20	20	5	8				
425054	GREAT DARLING ANABRANCH TARA DOWNS	14/11/2013 LF	Level Flow	27	42					25	25	25	6	9				
42510036	Darling River at Tulpa	1/03/2000 LCT	Level Conductivity and Temperature	23		12	13				5	5	6		4	3		
42510037	Darling River upstream Weir 32	17/08/2000 LCT	Level Conductivity and Temperature	29		13	17				5	5	7		4	4		
42510091	Darling River upstream Menincoort	16/08/2000 LCT	Level Conductivity and Temperature	23		12	13				5	5	6		4	3		
42510092	Darling River upstream Tulpa	15/08/2000 LCT	Level Conductivity and Temperature	25		12	13				5	5	6		4	3		
42510417	Darling River at Menincoort	1/03/2000 LCT	Level Conductivity and Temperature	23		12	13				5	5	6		4	3		
425900	DARLING RIVER AT TULPA	29/11/1960 LCT	Level Flow Conductivity Temperature	47	67	13	17			29	34	35	8	12	4	4		

Current storages

Figure 112 - Darling (425) current storages

STATION #	SYNNAME	COMMENCE CODE	CURRENT PARAMETERS	Sum or interested parties (1-3)						Flow regime importance where applicable			Interested parties above					
				Level	Flow	EC	Temp.	Rain	DO	Low Flow	Medium Flow	High Flow	Level	Flow	EC	Temp.	Rain	DO
425019	DARLING RIVER AT LAKE WETHERELL + TANDURE TOTAL STORAGE	1/01/1961 L	Level Volume	24	40					20	20	20	6	10				
425021	DARLING RIVER@LAKE PAMMAROO@COPI HOLLOW TOTAL STORAGE	1/01/1961 L	Level Volume	27	46					20	20	20	6	10				
425022	DARLING RIVER AT LAKE MENINDEE - STORAGE GAUGE	16/09/1961 L	Level Volume	32	52					20	20	20	7	11				
425023	LAKE CAMNDILLA - STORAGE GAUGE	1/01/1961 L	Level Volume	27	41					20	20	20	6	10				
42510037	MENINDEE LAKES AT COPI HOLLOW		Level Volume	31	43					20	20	20	6	10				

Potential Upgrades

Figure 113 - Darling (425) potential upgrade sites

Basin- Site ID	Location	Current Monitoring (July 2020)	Request type (flow and storage levels)	Request reason - Summary	Request Status
425042	Lake Pamamaroo at d/s Outlet Regulator	Manual Level	Level	To better monitor Menidee Lakes Storages	Proposed - Subject to further client consultation and review
425043	Lake Wetherall at d/s Outlet Regulator	Manual Level	Level	To better monitor Menidee Lakes Storages	Proposed - Subject to further client consultation and review
425044	Lake Menidee at d/s Outlet Regulator	Level	Level	To better monitor Menidee Lakes Storages	Proposed - Subject to further client consultation and review

Potential Downgrades

Nil

Stream and Storage Water Quality - Water Quality Analyte Codes and Analyte

Table 19 - List of analytes across the NSW WQ Monitoring Network- Source WaterNSW Water Monitoring Program June 2019.

Analyte Codes	Analyte
Group: Algal	
2000	Algal biovolume (mm3/L)
2002	Algal Total Count (cells/mL)
2004	Areal Standard Unit (algae)
2005	Areal Standard Unit (Cyano)
2006	Areal Standard Unit (Toxic)
2007	Chlorophyll-a (ug/L)
2007	Chlorophyll-a (ug/L)
2008	Cyanobacteria Total Count (cells/mL)
2009	Cyanobacterial biovolume (mm3/L)
2011	GEOSMIN
2014	Lorenzen (ug/L)
2015	MIB
2074	Microcystin LR+RR+YR (ug/L)
2026	Phaeophytin (ug/L)
2026	Phaeophytin (ug/L)
2028	Toxic Cyanobacterial biovolume (mm3/L)
2029	Toxic Cyanobacterial Count (cells/mL)
2030	Toxic Total Algal ASU
2031	Toxic Total Algal Biovolume
2032	Toxic Total Algal Count
Group: Bacterial	
2106	Clostridium perfringens (cfu/100 mL)
2110	Coliforms Total (cfu/100mL)
2111	E. coli (orgs/100mL)
2116	Enterococci (cfu/100ml)
Group: General	
2204	Dam Seepage Flow
2212	Gross Alpha
2213	Gross Beta
2221	SAR
Group: Heavy Metals	

Analyte Codes	Analyte
2301	Antimony Total (mg/L)
2303	Arsenic Total (mg/L)
2305	Barium Total (mg/L)
2307	Beryllium-Total (mg/L)
2311	Boron Filtered (mg/L)
2312	Boron Total (mg/L)
2314	Cadmium Total mg/L
2320	Chromium Total mg/L
2322	Cobalt Total (mg/L)
2323	Copper Filtered mg/L
2324	Copper Total mg/L
2344	Lead Total (mg/L)
2345	Lithium -Filtered (mg/L)
2350	Mercury Total (mg/L)
2352	Molybdenum Total (mg/L)
2356	Nickel Total (mg/L)
2364	Selenium Total (mg/L)
2366	Silver Total (mg/L)
2367	Strontium -Filtered (mg/L)
2381	Tin Total (mg/L)
2385	Uranium Total (mg/L)
2387	Vanadium Total (mg/L)
2392	Zinc Filtered mg/L
2393	Zinc Total (mg/L)
Group: Metals	
2500	Aluminium Filtered (mg/L)
2502	Aluminium Total (mg/L)
2505	Bromide
2508	Calcium Filtered (mg/L)
2509	Calcium Total (mg/L)
2510	Ferrous Ion (ug/L)
2511	Iron Filtered (mg/L)
2513	Iron Total (mg/L)
2516	Magnesium Filtered
2517	Magnesium Total (mg/L)
2518	Manganese Filtered (mg/L)
2520	Manganese Total (mg/L)

Analyte Codes	Analyte
2523	Potassium Total (mg/L)
2524	Potassium Filtered (mg/L)
2525	Sodium Filtered (mg/L)
2526	Sodium Total (mg/L)
Group: Non-Metals	
2701	Chloride (mg/L)
2702	Free Chlorine residual mg/L (field)
2708	Fluoride mg/L
2724	Unionised Hydrogen Sulphide
2711	Iodide (mg/L)
2712	Iodine
2716	Sulphate (mg/L)
2703	Total residual chlorine mg/L (Field)
Group: Natural Organic Matter	
2804	Biochemical Oxygen Demand (mg/L)
2808	Dissolved Organic Carbon (mg/L)
2811	Total Organic Carbon (mg/L)
2813	UV Absorbing constituents (organic)
Group: Nutrients - LOWER-LEVEL LEVEL METHODS USED FOR METRO CATCHMENTS	
2901	Nitrate as N
2903	Nitrite as N
2904	Nitrogen Ammoniacal (mg/L)
2909	Nitrogen Oxidised (mg/L)
2910	Nitrogen TKN (mg/L)
2911	Nitrogen Total (mg/L)
2914	Phosphorus Soluble Reactive (mg/L)
2915	Phosphorus Total (mg/L)
2920	Silica Total (mg/L)
2916	Silicate Reactive (SiO ₂ mg/L)
Group: Nutrients - RURAL CATCHMENTS	
2901	Nitrate as N
2903	Nitrite as N
2904	Nitrogen Ammoniacal (mg/L)
2909	Nitrogen Oxidised (mg/L)
2910	Nitrogen TKN (mg/L)
2911	Nitrogen Total (mg/L)
2914	Phosphorus Soluble Reactive (mg/L)

Analyte Codes	Analyte
2915	Phosphorus Total (mg/L)
2920	Silica Total (mg/L)
2916	Silicate Reactive (SiO ₂ mg/L)
Group: Pesticides	
3003	"2,4-D (ug/L)"
3097	Acephate (ug/L)
3098	Aminopyralid (ug/L)
3015	Amitrole (ug/L)
3023	Atrazine (ug/L)
3080	Azinphos-methyl (ug/L)
3100	Chlorfenvinphos (E+Z) (ug/L)
3096	Chlorothalonil (ug/L)
3036	Chlorpyrifos (ug/L)
3038	Clopyralid (ug/L)
3046	Diazinon (ug/L)
3049	Dichlobenil (ug/L)
3052	Dimethoate (ug/L)
3054	Diuron (ug/L)
3099	Fluproponate (ug/L)
3066	Fluroxypyr (ug/L)
3068	Glyphosate (ug/L)
3072	Hexazinone (ug/L)
3075	MCPA (ug/L)
3095	Metsulfuron Methyl (ug/L)
3087	Picloram (ug/L)
3231	Simazine (ug/L)
3093	Triclopyr (ug/L)
3094	Trifluralin (ug/L)
Group: Physical	
3300	Alkalinity (mgCaCO ₃ /L)
3338	Apparent Color Spectrometric @ 420nm (Unfiltered)
3304	Bicarbonate alkalinity
3308	Conductivity (mS/m)
3309	Conductivity Field (mS/cm)
3310	Conductivity uS/cm
3312	Dissolved Oxygen (%Sat)
3313	Dissolved Oxygen (mg/L)

Analyte Codes	Analyte
3339	Hydroxide Alkalinity as CaCO ₃
3316	Odour Drinking Water
3317	Oxidation reduction pot. (field)
3318	pH (Field)
3319	pH (Lab/Field)
3321	Secchi Depth
3322	Suspended Solids (mg/L)
3324	Temperature Ambient (Deg C)
3326	Total Dissolved Solids (mg/L)
3327	Total Hardness (mgCaCO ₃ /L)
3330	True Colour at 400nm
3331	True Colour at 420nm
3334	Turbidity Field (NTU)
3335	Turbidity Lab/Field (NTU)
Group: Protozoa	
3442	Confirmed Cryptosporidium oocysts (Raw Result)
3441	Confirmed Giardia cysts (Raw Result)
3407	Crypto DAPI /10L Adj for Recovery
3410	Crypto oocysts IFA (Adj for Recovery for 10L)
3440	Cryptosporidium Mimic
3403	Cryptosporidium oocysts IFA (Raw Result)
3418	Cryptosporidium Percentage Recovery %
3409	DAPI+ Crypto oocysts (per 10L)
3436	DAPI+ Cryptosporidium oocysts by Volume
3425	DAPI+ Giardia cysts (per 10L)
3435	DAPI+ Giardia cysts by Volume
3422	Giardia (cysts/v)
3429	Giardia cysts IFA (Adj for Recovery to 10L)
3430	Giardia cysts IFA (Raw Result)
3426	Giardia DAPI /10L Adj for Recovery
3433	Giardia Percentage Recovery %
3437	Parasite Sample Volume
3446	Pellet Size
Group: Synthetic Organic Matter	
3530	"trans-1,2-Dichloroethene (ug/L)"
3505	1,1-Dichloroethane (ug/L)
3515	1,2-Dichloroethane (ug/L)

Analyte Codes	Analyte
3556	Benzene (ug/L)
3618	Carbonate Alkalinity as CaCO ₃
3587	Hexachlorobutadiene (ug/L)
3531	trans-1,3-Dichloropropene (ug/L)
3612	Trichloroethene (ug/L)
3614	Trihalomethanes (ug/L)
3616	Vinyl chloride (ug/L)

Stream and Storage Meteorological

Figure 114 - Water related meteorological monitoring sites - NSW

REAL TIME DATA - WEATHER STATIONS

All data times are Eastern Standard Time

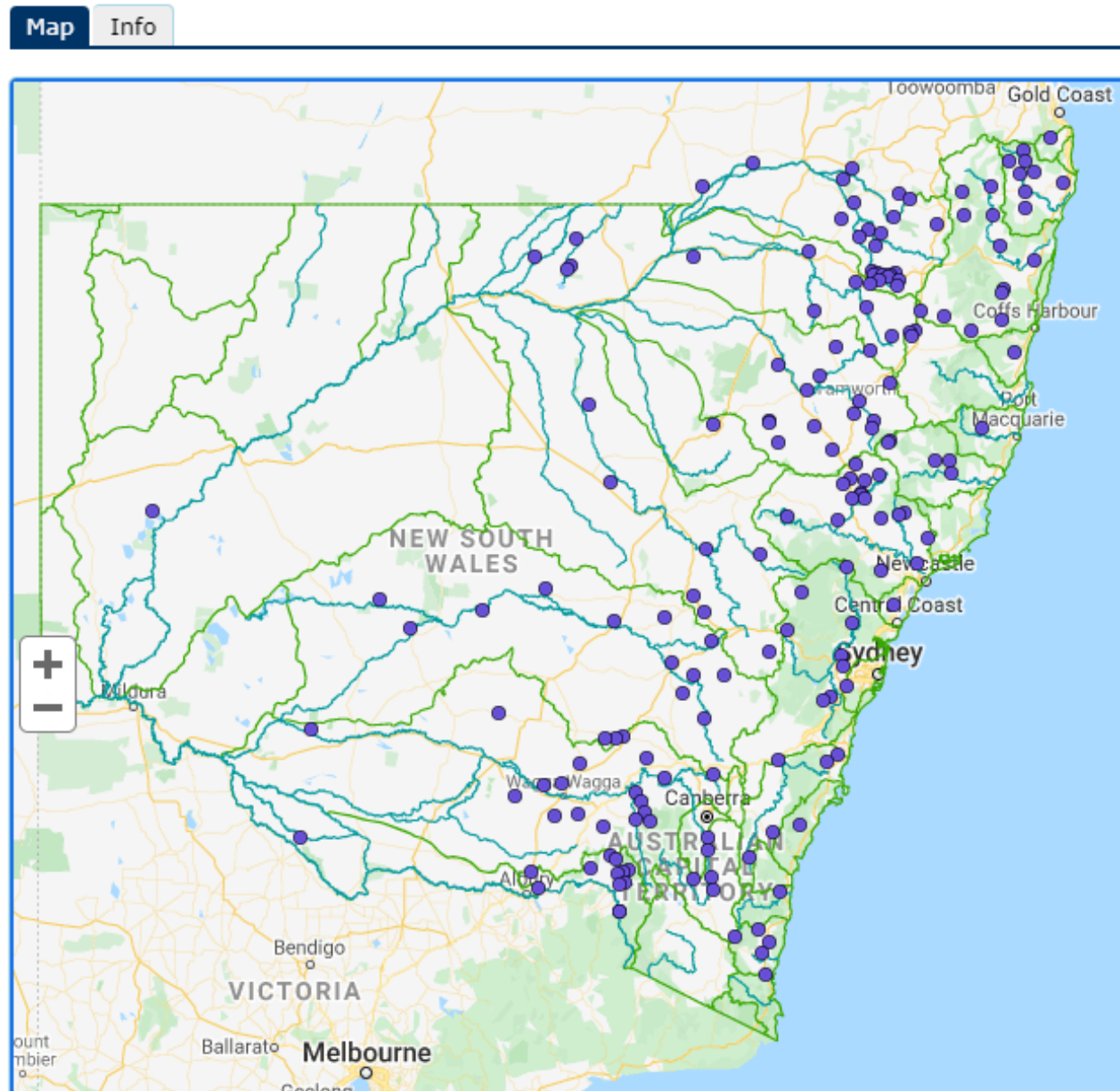


Figure 115 - Example of Meteorological sites on Telemetry - Murray (409)

