Department of Primary Industries
Office of Water

General Purpose Water Accounting Report 2013–2014

Namoi catchment

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Cover image: Narrabri Creek at Narrabri, courtesy of NSW Office of Water Hydrometric Gauging Team

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Abbreviations

Acronym	Description
ACT	Australian Capital Territory
AWAS 1	Australian Water Accounting Standard
AWD	Available Water Determination
CAIRO	Computer Aided Improvements to River Operations
Ck	Creek
D/S	Downstream
GIS	Geographic Information System
GL	Gigalitres (1,000,000,000 litres)
GMA	Groundwater Management Area
GPWAR	General Purpose Water Accounting Report
IQQM	Integrated Quantity and Quality Model
LAS	Licencing Administration System
MDBA	Murray-Darling Basin Authority
ML	Megalitres (1,000,000 litres)
MODFLOW	Modular Three Dimensional Finite-Difference Groundwater Flow Model
NSW	New South Wales
OEH	Office of Environment and Heritage
U/S	Upstream
WASB	Water Accounting Standards Board
WSP	Water Sharing Plan

Glossary

Term	Definition
Allocation	The specific volume of water allocated to water allocation accounts in a given season, defined according to rules established in the relevant water plan.
Allocation assignments	The transfer of water between licence holder allocation accounts as a result of a trade agreement. The assignment becomes part of the receiver's current year allocation account water.
Allocation Account	Water account attached to an access licence used to track the balance of account water.
Aquifer	Soil or rock below the land surface that is saturated with water. A confined aquifer has layers of impermeable material above and below it and is under pressure. When the aquifer is penetrated by a well, the water rises above the top of the aquifer. In an unconfined aquifer, the upper water surface (water table) is at atmospheric pressure and thus is able to rise and fall.
Available Water Determination (AWD)	The process by which water is made available for use and shared amongst water users who hold a water access licence. It determines the volume of water that is to be added to an individuals licence allocation account.
Australian Water Accounting Standard (AWAS)	A national standard that prescribes the basis for preparing and presenting a General Purpose Water Accounting Report (GPWAR). It sets out requirements for the recognition, quantification, presentation and disclosure of items in a GPWAR.
Back-calculation	A calculation approach using a mass balance to determine an unknown variable (used to calculate storage inflows based on balancing the change in storage volume where inflow is the only unknown).
Basic rights	The non-licensed right to extract water to meet basic requirements for household purposes (non-commercial uses in and around the house and garden) and for watering of stock. It is available for anyone who has access to river frontage on their property.
Computer Aided Improvements to River Operations (CAIRO)	A spreadsheet-based water balance model used for optimising river operations (orders and releases)
Carryover	The volume or share component that may be reserved by a licence holder for use in the proceeding year.
Catchment	The areas of land which collect rainfall and contribute to surface water (streams, rivers, wetlands) or to ground-water. A catchment is a natural drainage area, bounded by sloping ground, hills or mountains, from which water flows to a low point.
Conveyance licence	Defined licence category that provides an allowance for losses in the delivery of water.
Dead storage	The volume in storage that is generally considered unavailable for use (e.g water level below release valves) due to access and often poor water quality.
Dealings	A water dealing refers to a change that can be made to a licence, in particular, those arising from trading including the sale of all or part of an access licence or account water. May also include a change in location, licence category or consolidation/subdivision of licences.
Double entry accounting	Double-entry accounting is a method of record-keeping that records both where money (or in this case water) comes from and where it goes. Using double-entry means that water is never gained or lost - it is always transferred from somewhere (a source account) to somewhere else (a destination account).
Effective storage	The total volume of storage minus the dead storage component – the volume generally considered as useable.
Effluent	Flow leaving a place or process. Sewage effluent refers to the flow leaving a sewage treatment plant. An effluent stream is one which leaves the main river and does not return.
Entity	A defined geographical area or zone within the accounting region. Transactions and reports are produced for each entity.
End of system	The last defined point in a catchment where water information can be measured and/or reported.

Environmental water	Water allocated to support environmental outcomes and other public benefits. Environmental water provisions recognise the environmental water requirements and are based on environmental, social and economic considerations, including existing user rights.
Equity	Total assets minus total liabilities
Evaporation	The process by which water or another liquid becomes a gas. Water from land areas, bodies of water, and all other moist surfaces is absorbed into the atmosphere as a vapour.
Evapotranspiration	The process by which water is transmitted as a vapour to the atmosphere as the result of evaporation from any surface and transpiration from plants.
Extraction	The pumping or diverting of water from a river or aquifer by licensed users for a specific purpose (irrigation, stock, domestic, towns, etc). The volume is measured at the point of extraction or diversion (river pump, diversion works etc).
General Purpose Water Accounting Report (GPWAR)	A report prepared according to the Australian Water Accounting Standard. It is comprised of a number of components including a contextual statement, a Statement of Water Assets and Water Liabilities, a Statement of Change in Water Assets and Water Liabilities, a Statement of Physical Water Flows, Notes and Disclosures, and an assurance and accountability statement
General security licence	A category of water access licence implemented under the *Water Management Act 2000*. Forms the bulk of the water access licence entitlement volume in NSW and is a low priority entitlement i.e. only receives water once essential and high security entitlements are met in the available water determination process.
Groundwater	Water location beneath the ground in soil pore spaces and in the fractures of rock formations.
High security licence	A category of licence water access licence implemented under the *Water Management Act 2000*. Receives a higher priority than general security licences but less priority than essential requirements in the available water determination process.
HYDSTRA database	A database used by NSW Office of Water to store continuous time series data such as river flow, river height, and water quality.
Inflows	Surface water runoff and deep drainage to groundwater (groundwater recharge) and transfers into the water system (both surface and groundwater) for a defined area.
Inter-valley trade	Trade of licence holder allocation account water, via allocation assignment, from one catchment to another catchment (or state).
Intra-valley trade	Trade of licence holder allocation account water, via allocation assignment, within the same catchment.
Licence Administration System (LAS)	The system used by NSW Office of Water to manage water access licence information and transaction.
Liability	A legally binding obligation to settle a debt.
Median	The middle point of a distribution, separating the highest half of a sample from the lowest half.
Non-physical transaction	An accounting transaction representing a process that is not a component of the water cycle (e.g. an available water determination).
Physical transaction	An accounting transaction representing a process of the water cycle (e.g. a extraction)
Recharge	Groundwater recharge is a hydrologic process where water drains downward from surface water to groundwater. Groundwater is recharged naturally by rain, floods and snow melt and to a smaller extent by drainage directly from surface water (such as rivers and lakes).
Regulated river	A river system where flow is controlled via one or more major man-made structures e.g. dams and weirs. For the purposes of the *Water Management Act 2000* a regulated river is one that is declared by the Minister to be a regulated river. Within a regulated river system licence holders can order water against a held entitlement.
Replenishment flows	Flows provided along effluent systems downstream of a water source to supply water for household, town use and stock.

Return inflows	Water that has been diverted from a river by a water user and is then returned to the river after use (e.g. can include non-consumptive uses, such as hydropower, cooling water for industry or water for aquaculture). This water is included as an inflow to the basin because the water is available to be diverted downstream or will pass the basin outlet.
Share component	An entitlement to water specified on the access licence, expressed as a unit share or in the case of specific purpose licences (eg. local water utility, major water utility and domestic and stock) a volume in megalitres. The amount of water a licence holder is allocated as a result of an available water determination and the amount they can take in any year is based on their share component.
Snowpack	Volume of water stored in packed snow that upon melting will result in a system inflow.
Steady State	A condition in a physical groundwater system where the volume does not change over time, or in which any one change in volume is continually balanced by another.
Storage	A state-owned dam, weir or other structure which is used to regulate and manage river flows in the catchment and the water bodies impounded by these structures.
Storage discharge	The volume of water released from storage in a specified time frame.
Storage reserve	Proportion of water in a storage reserved in the resource assessment process for future essential or high security requirements (e.g. town water).
Storage volume	The total volume of water held in storage at a specified time.
Supplementary water	Unregulated river flow available for extraction under a supplementary licence.
Surface water	All water that occurs naturally above ground including rivers, lakes, reservoirs, creeks, wetlands and estuaries.
Translucent flow	The release of an agreed percentage of an incoming flow event from a dam for environmental purposes immediately downstream of the dam.
Transparent flow	The release of all or part of an incoming flow event from a dam for environmental purposes at one or more sites downstream of the dam.
Tributary	A smaller river or stream that flows into a larger river or stream. Usually a number of smaller tributaries merge to form a river.
Uncontrolled flow	Water permitted to be extracted without debt under a general security access licence during a supplementary flow event. The extracted water may be progressively debited to the general security account if water availability exceeds predefined levels.
Ungauged catchment	A catchment without a flow gauge to accurately record stream flows. Modelled estimates must be used to approximate the contribution of ungauged catchments to the main river.
Water accounting	The systematic process of identifying, recognising, quantifying, reporting, assuring and publishing information about water, the rights or other claims to that water, and the obligations against that water
Water assets	The physical water held in storage, as well as any claims to water that are expected to increase the future water resource (e.g. external water entering the system through intervalley trading).
Water liabilities	Claims on the water assets of the water report entity including water that has been allocated to licence holder accounts or environmental accounts but yet to be taken at the end of the reporting period.
Water sharing plan	A water management plan that defines the rules for sharing of water within a region under the *Water Management Act 2000*.

Introduction

This document is a General Purpose Water Accounting Report (GPWAR) for the Upper Namoi and Lower Namoi Regulated River Water Sources prepared by the New South Wales Office of Water under the Australian Water Accounting Standard 1 (WASB, 2012).

It has been prepared for the reporting period of 1 July 2013 to 30 June 2014 and provides a consolidated and informative annual summary of the available water resources and the water resource management that occurred during this period.

The GPWAR consists of:

- A contextual statement, summarising the climatic conditions, water resources, and water resource management for the Namoi in 2013-14.
- A physical flow diagram, illustrating changes in storage volumes and the associated inflows and outflows.
- Water accounting statements presenting the opening and closing balances, and itemised changes to these balances for available water resources (water assets) and licenced allocation accounts (water liabilities).
- Disclosure notes (linked to the figures within the water accounting statements) providing detailed information of accounting components such as planned and held environmental water, available water determinations, temporary trading, supplementary announcements, allocation account balances, and physical flows.

While groundwater have not been specifically included in the GPWAR (aside from physical flow interactions with the regulated rivers), annual summary information pertaining to physical groundwater flows, and the management of groundwater resources in the Namoi catchment is presented in Appendix 1 of the GPWAR.

The Peel catchment has been covered in a separate GPWAR currently published on the NSW Office of Water website (www.water.nsw.gov.au).

As Deputy Commissioner of the New South Wales Office of Water, I hereby declare:

- The information presented in these accounts as a faithful representation of the management and operation of the Namoi Regulated River Water Sources in 2013-2014.
- All data presented in this report is based on the best available information at the time of publication.
- The NSW Office of Water has to the best of its ability prepared this GPWAR for the Upper Namoi and Lower Namoi Regulated River Water Sources for the 2013-14 water year in accordance with the Australian Water Accounting Standard 1.

Bruce Cooper

Deputy Commissioner, Water Resource Assessment and Management

NSW Office of Water

Dated: 28/4/2015

Contextual statement

The Namoi catchment is a sub-catchment of the eastern Murray-Darling Basin. It covers an area of about 42,000 square kilometres stretching 350 kilometres from the Great Dividing Range near Tamworth to the Barwon River near Walgett. The Namoi is bounded by the Great Dividing Range in the east, the Liverpool Ranges and Warrumbungle Ranges in the south, and the Nandewar Ranges and Mount Kaputar to the north. Elevations range from over 1,500 metres above sea level in the south and east to just 100 metres on the alluvial floodplain of the lower Namoi, west of Narrabri.

Major tributaries of the Namoi River include Coxs Creek and the Mooki, Peel, Manilla, and McDonald Rivers, all of which join the Namoi upstream of Boggabri. The Peel River which has a catchment area of around 4,700 square kilometres, contributes an average annual volume of around 280,000 megalitres to the Namoi River.

Streamflows in the Namoi catchment are regulated by three major storages; Keepit Dam on the Namoi River, Split Rock Dam on the Manilla River and Chaffey Dam on the Peel River.

Agricultural production comprises approximately half of the regional economy. Major industries include cotton, livestock production, grain and hay, poultry and horticulture. The Peel River also provides the bulk of urban water supply for Tamworth (supplemented by Dungowan storage located on Dungowan Creek). The regulated section of the Peel River is managed under a separate water allocation scheme and water sharing plan to the regulated Namoi River.

The Namoi and Peel catchments were part of the lands originally occupied by the Kamilaroi people. Today approximately 100,000 people live within the Namoi catchment, mostly along the river and its tributaries between Tamworth and Narrabri. The largest urban centre in the valley is Tamworth, on the Peel River, which has a population of nearly 33,500 people. Other major centres are Gunnedah (7,500 people) and Narrabri (6,100 people) – both are located on the banks of the Namoi River. Smaller towns include Barraba, Manilla, Quirindi, Walgett, Wee Waa and Werris Creek.

Significant ecological features of the catchment include the many small floodplain wetlands associated with the river, and the large internal drainage basin of Lake Goran south of Gunnedah. Extensive areas of native woodland are conserved in the Pilliga Forest which is the largest remaining dry sclerophyll forest west of the Great Dividing Range in NSW.

More detailed information on the catchment is available in the report 'Water resources and management overview: Namoi catchment' published in 2011 and available on the NSW Office of Water website at www.water.nsw.gov.au.

Accounting extent

The accounted river extent is illustrated in Figure 1. It includes the Upper Namoi Regulated River from Split Rock Dam to Keepit Dam, the Lower Namoi Regulated River from Keepit Dam to the Namoi-Barwon River confluence, Pian and Gunidgera Creeks.

The Peel catchment is excluded from this GPWAR[1], apart from the measured total annual flow that leaves the Peel River and flows into the Regulated Namoi River (measured by the flow gauging station at Carroll Gap).

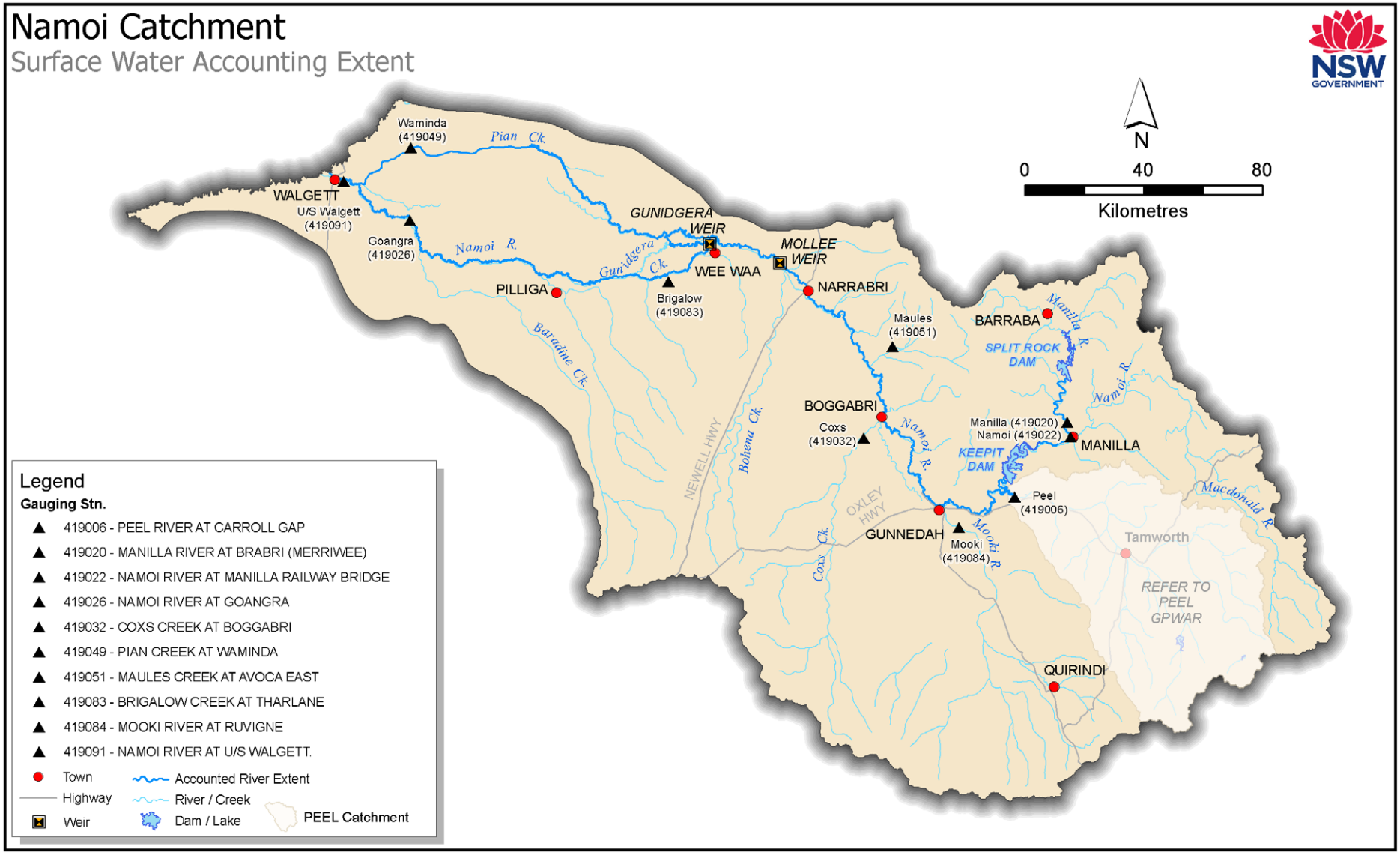
All water licences and water provisions managed by Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2003 are considered.

While estimates of physical groundwater volumes that interact with the regulated river are included in GPWAR statements where possible (and any interactions not directly estimated form part of the unaccounted difference) all other groundwater aquifer flows and groundwater

[1] The Peel catchment has been covered in a separate GPWAR available on the New South Wales Office of Water website.

management are excluded from the GPWAR. Alternatively, supporting information for groundwater in the Namoi catchment for 2013-14 is provided in Appendix 1 of this document.

Figure 1: Surface water geographical accounting extent



Climate

The Namoi catchment experienced a dry 2013-14, with the main exception being March 2014, where in excess of 100 mm of rainfall was received at Manilla (upper catchment) and Wee Waa (lower catchment) (Figure 2). Outside of this, monthly rainfalls were generally ranging between 10 and 50 mm below historical medians. It was particularly dry in the summer months, where historically the highest monthly rainfalls occur in the Namoi. Monthly rainfall statistics for Manilla and Wee Waa are displayed in Figure 2 and Table 1. In 2013-14 the annual rainfall distribution across the Namoi is displayed in Figure 3, and can be referenced against the mean annual rainfall distribution in Figure 4. Here it can be seen below average annual rainfall was consistently spread across the entire catchment.

Figure 2: Monthly Rainfall Data and historical median deviations at Manilla and Wee Waa

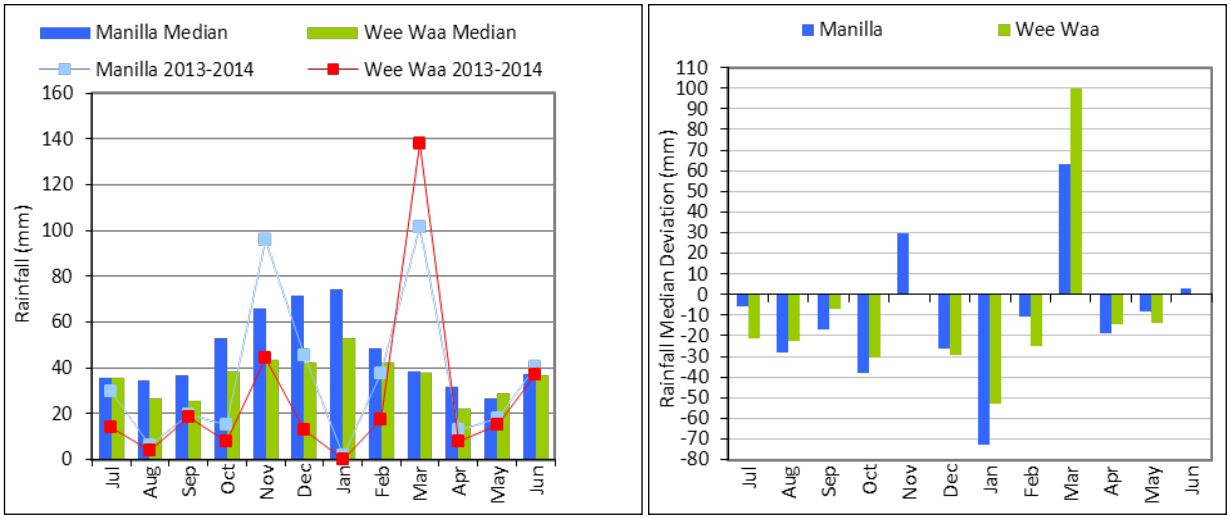


Table 1: 2013-14 monthly rainfall and historic monthly rainfall statistics at Manilla and Wee Waa[2]

Manilla	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
2013-14	**29.8**	**6.4**	**19.4**	**15.0**	**95.6**	**45.6**	**1.8**	**37.4**	**101.6**	**13.0**	**18.2**	**40.2**	**424.0**
Historic statistics													
Mean	41.7	38.6	41.5	58.1	69.1	74.6	85.0	67.7	52.8	39.0	39.6	44.0	647.0
Median	35.6	34.5	36.6	52.8	66.0	71.7	74.4	48.3	38.7	31.5	26.7	37.4	631.2
Lowest	0.9	0.0	0.4	1.8	2.3	2.0	1.8	1.5	0.0	0.0	0.0	0.8	221.0
Highest	170.6	149.1	166.4	227.3	242.0	218.4	308.3	263.2	295.2	174.4	173.0	173.3	1,141.7
Highest Year	1984	1952	1998	1955	2011	1921	1978	1955	1894	1905	1983	1920	1955-1956
Wee Waa	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
2013-14	**13.8**	**4.0**	**18.6**	**7.8**	**44.1**	**13.0**	**0.0**	**17.3**	**137.7**	**8.0**	**15.2**	**37.2**	**316.7**
Historic statistics													
Mean	42.4	35.0	35.1	47.7	56.5	56.9	78.2	63.3	51.3	36.4	43.6	45.0	589.5
Median	35.4	26.4	25.7	38.4	43.7	42.3	52.9	42.2	37.6	22.2	28.8	36.6	547.5
Lowest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	238.5
Highest	156.9	146.7	150.2	198.6	211.1	204.0	361.2	337.7	365.3	238.0	213.0	227.0	1,118.7
Highest Year	1921	1918	1998	1950	1924	1921	1974	1956	1894	1989	1991	1920	1889-1890

[2] Long term statistics are from the Bureau of Meteorology – climate data online, using the climatic stations '53044 – Wee Waa (George St) and '55031 – Manilla Post Office'. Historic record statistics are 1884 to 2014 for Wee Waa and 1883 to 2014 for Manilla

Figure 3: Namoi annual rainfall for 2013-14

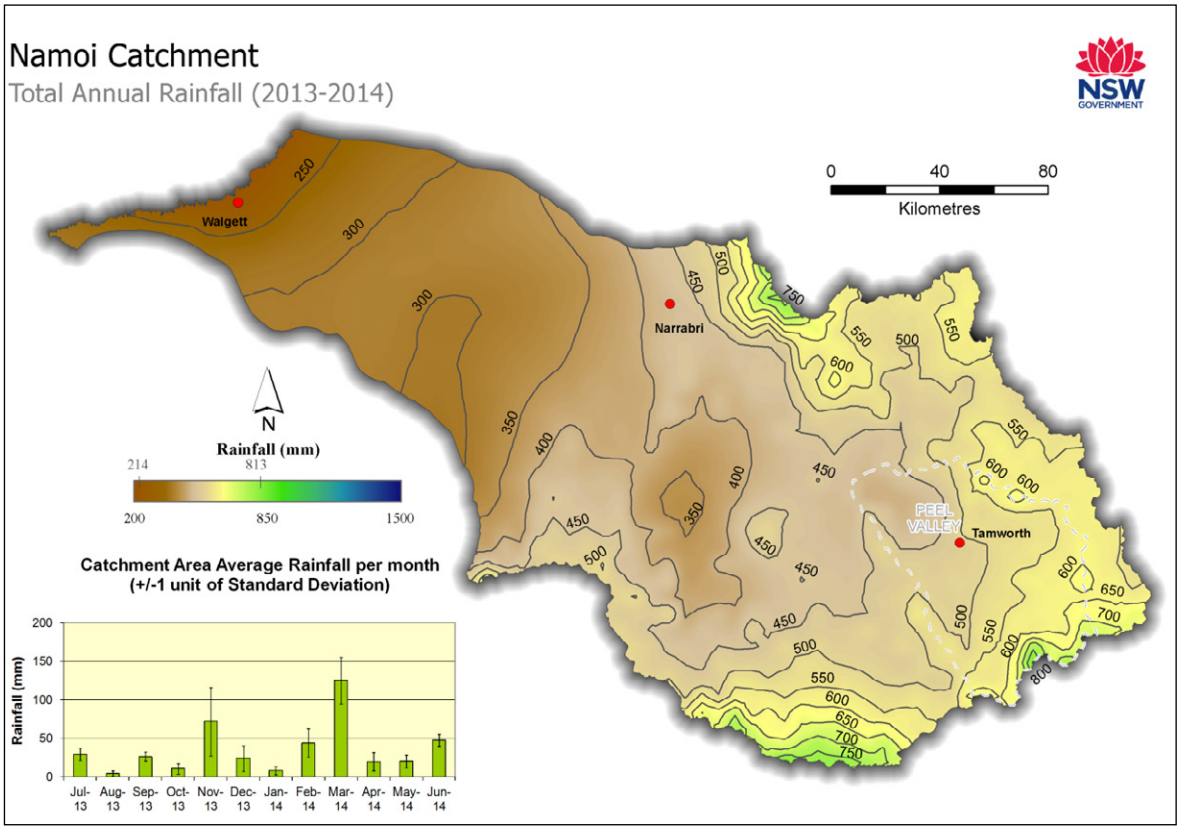
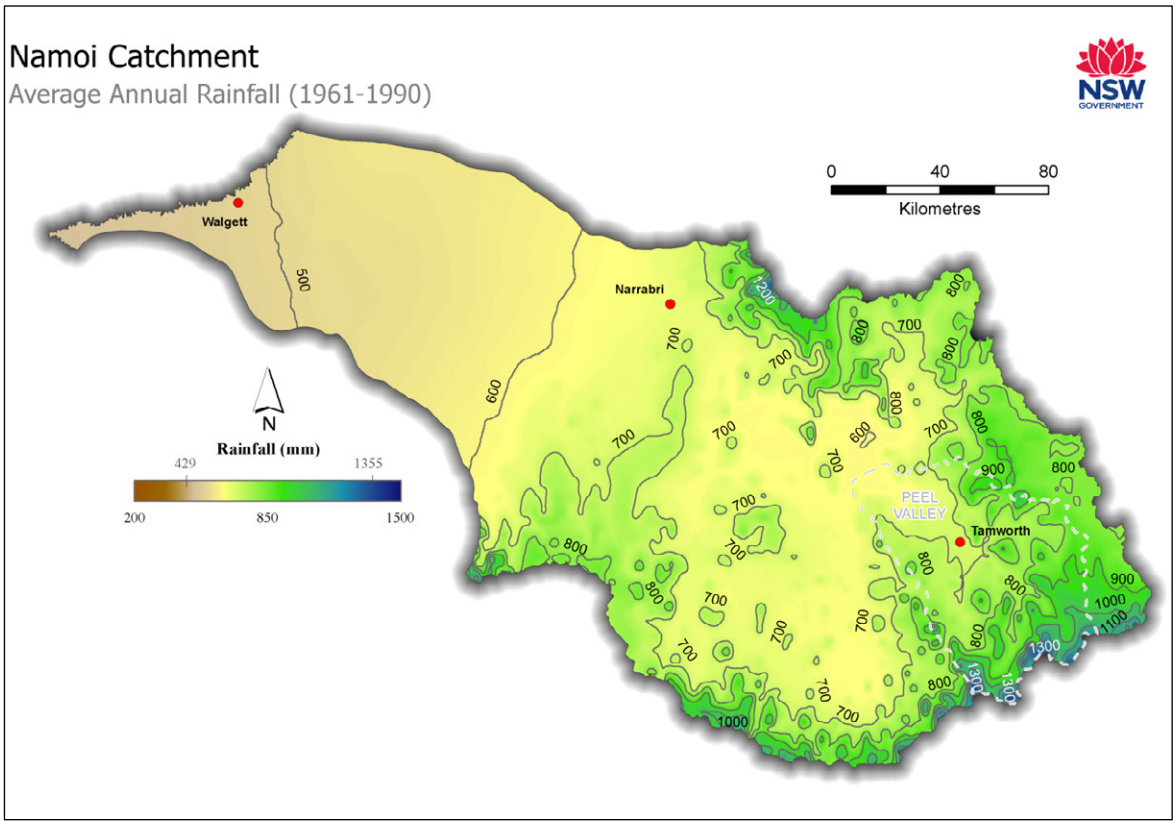


Figure 4: Average annual rainfall in the Namoi catchment (1961-1990)



Dam inflows and volume

Annual inflow during 2013-14 was well below average for Split Rock Dam (Figure 5). Natural inflows to Keepit were very low, however a bulk water transfer between the Split Rock and Keepit storages meant that by volume, inflow to Keepit was on average compared to the historical data (Figure 6). For Split Rock Dam inflows of 32,967 megalitres were only about 46 percent of the average annual inflow volume.

While no significant inflows occurred during the year to either of the dams the peak inflows to Split Rock occurred during November through to February, and this also corresponded to the period of water transferring to Keepit (Figure 7 and Figure 8).

Keepit Dam starting the year at 45 per cent of capacity (Figure 10), but following a dry year where demands for allocated water were high, the dam was drawn down and finished the 2013-14 season at 19 per cent of capacity.

Split Rock Dam commenced the year at 88 per cent of capacity (Figure 9) and finished the year at 21 per cent of capacity, as result of below average inflows, and the transfer of significant volumes to Keepit Dam.

Figure 5: Long-term inflows to Split Rock against mean and reporting year inflow

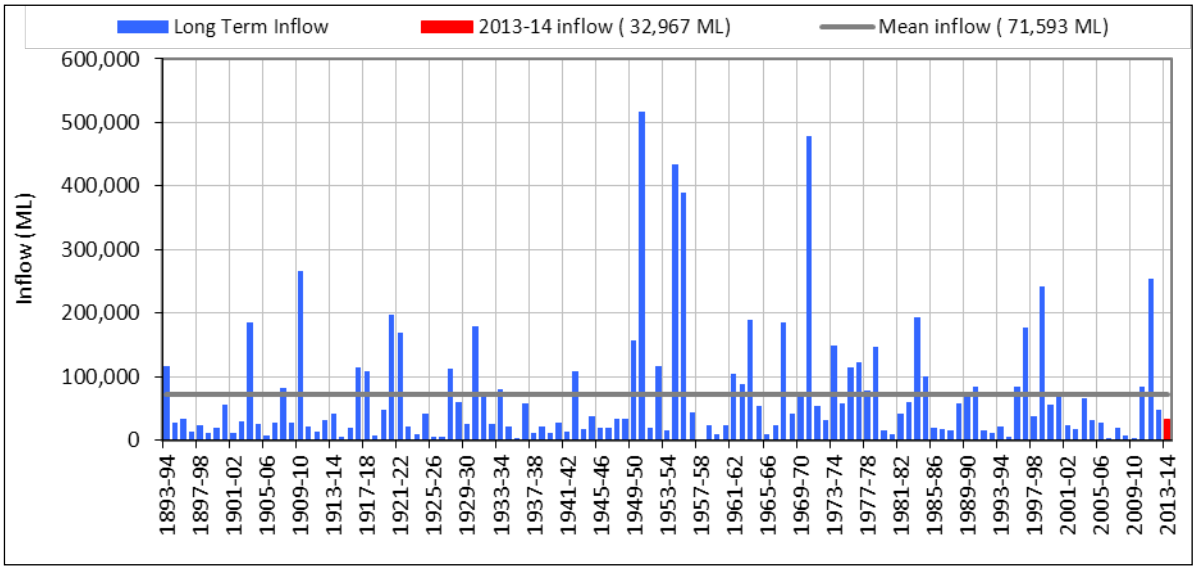


Figure 6: Long-term inflows to Keepit Dam against mean and reporting year inflow

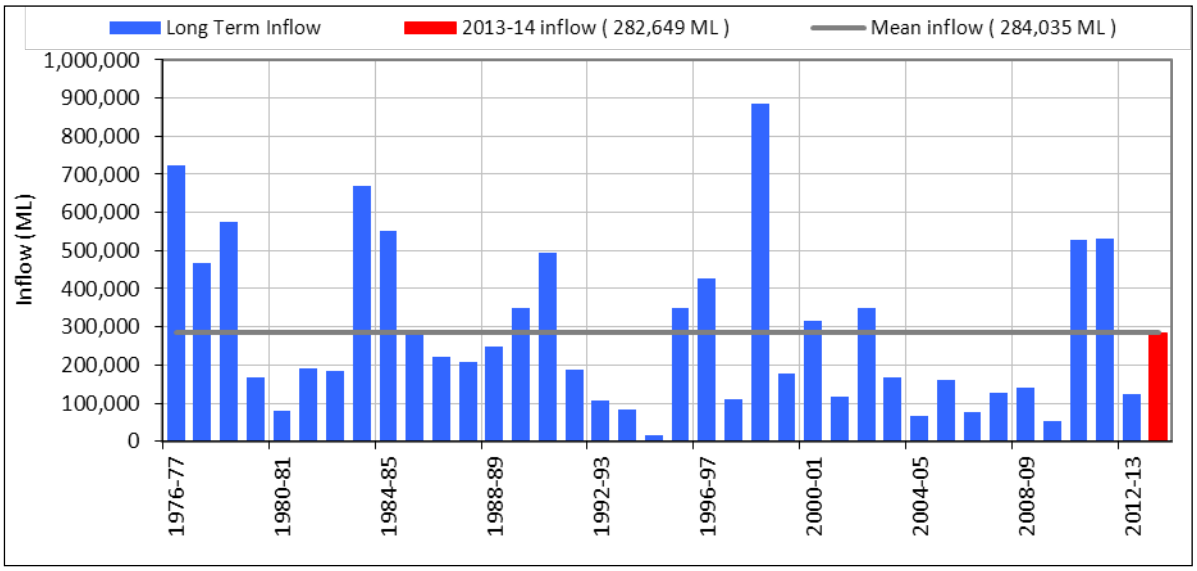


Figure 7: Daily inflows and rainfall at Split Rock 2013-14

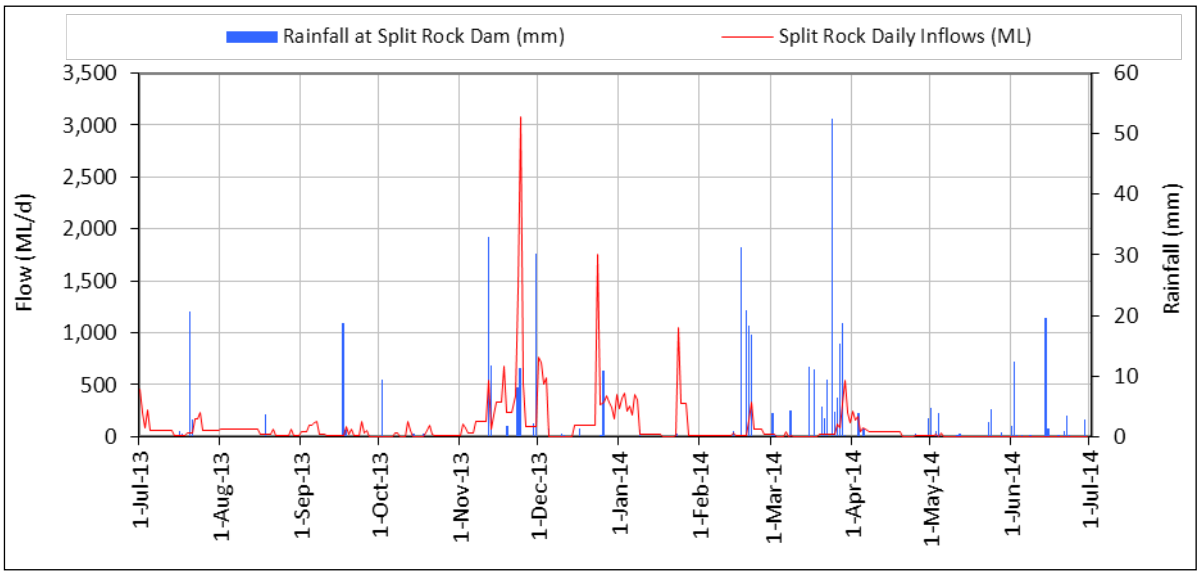


Figure 8: Daily inflows and rainfall at Keepit Dam 2013-14

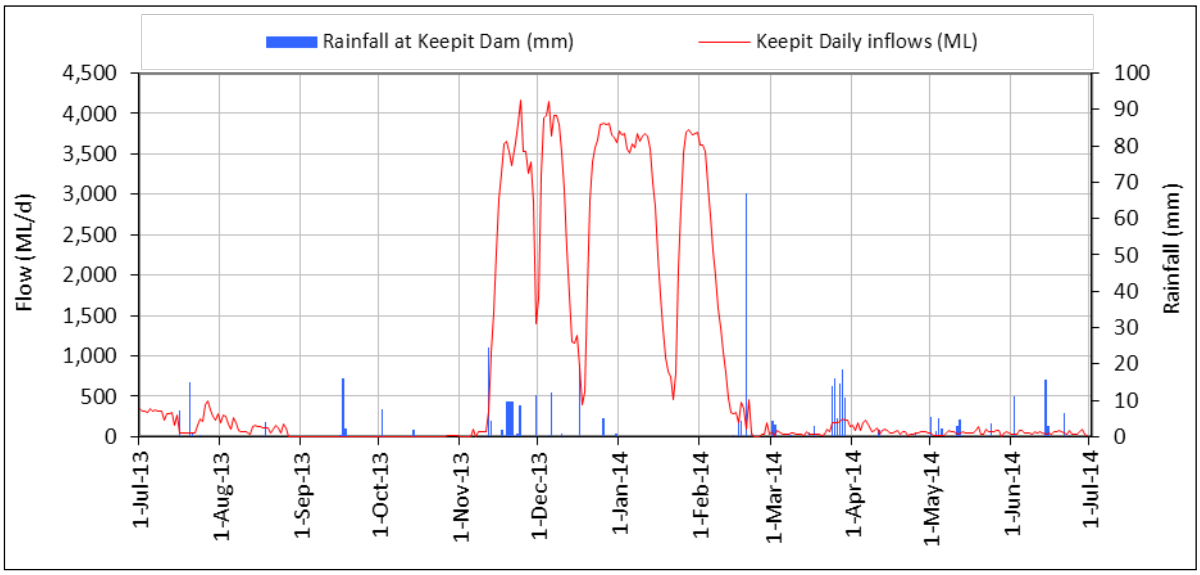


Figure 9: Split Rock Dam volume and percentage 2013-14

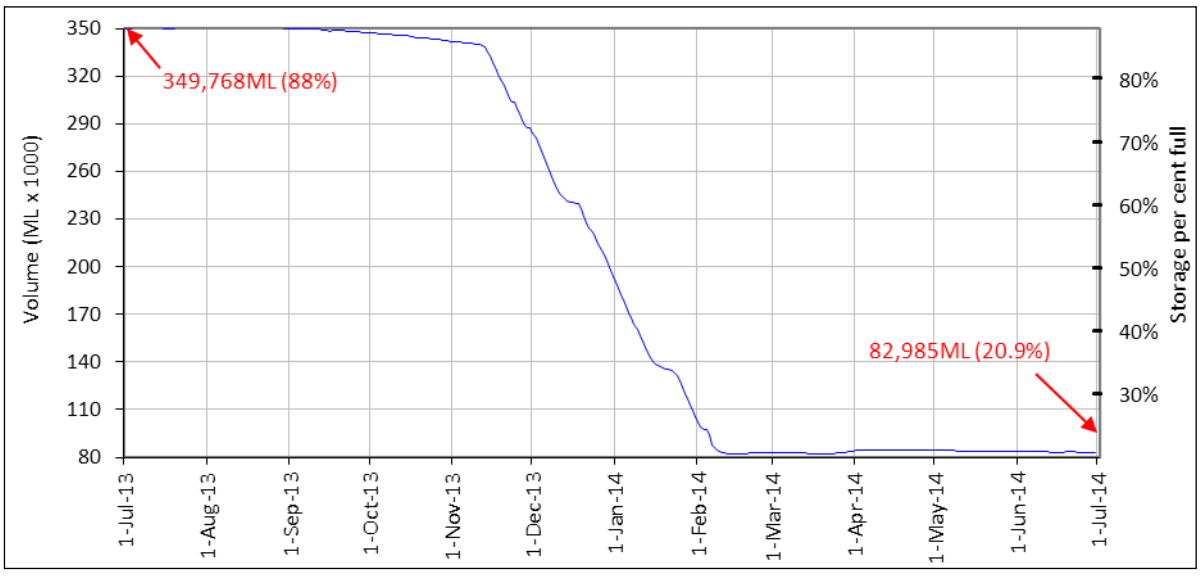
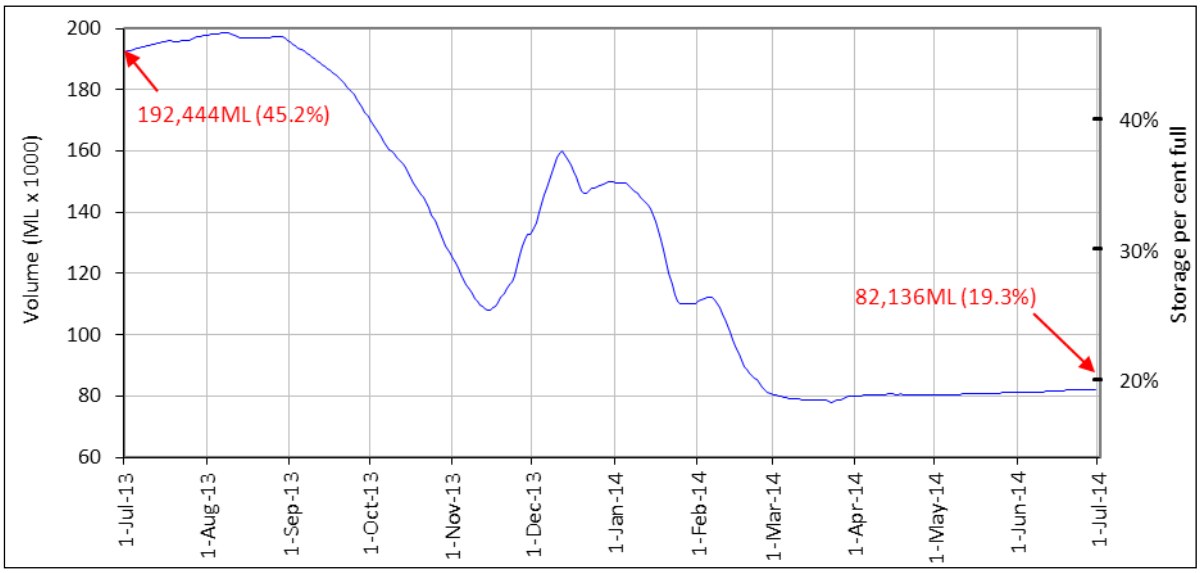


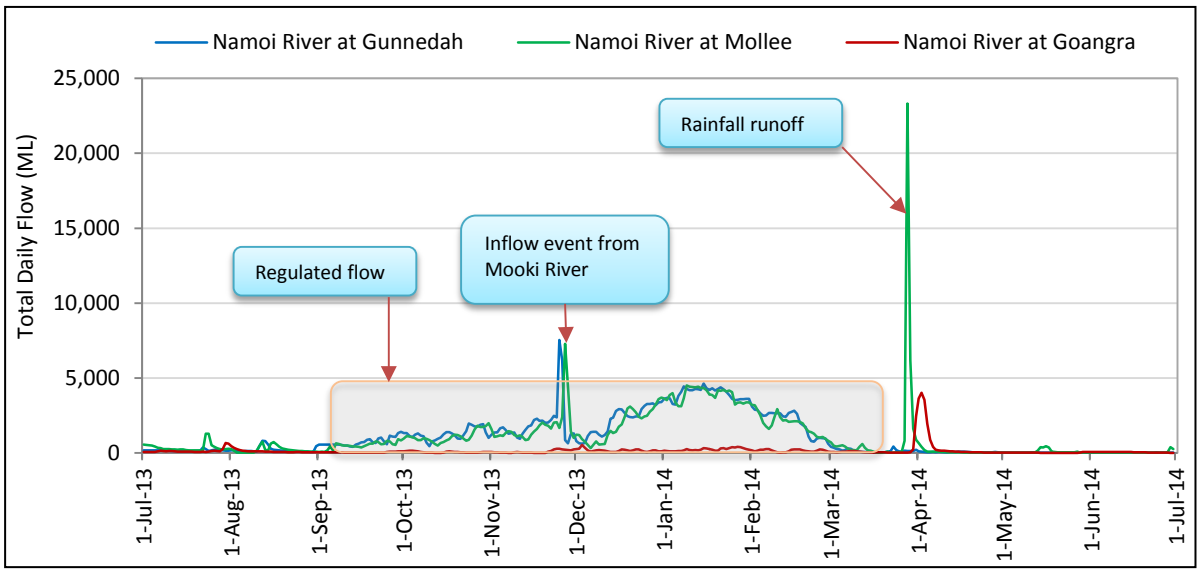
Figure 10: Keepit Dam volume and percentage 2013-14



High flow events

While no major flood events occurred in 2013-14 there was one moderate event in late March 2014, peaking at just below 25,000 megalitres per day (Figure 11). The same event left the Namoi system at flows of approximately 4,000 megalitres per day, following system losses and supplementary extraction. There was also a minor inflow event from the Mooki River towards the end of November 2013.

Figure 11: Total daily flow on the Namoi River at Gunnedah, Mollee and Goangra, 2013-14



Surface water resources and management

The Namoi water source was managed under the conditions set out in the Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2003. The licence allocation accounting rules that were in place are summarised in Table 2.

Table 2: Namoi licenced allocation accounting rules

Upper Namoi Regulate River Water Source					
Licence Category	**Account Limit**	**Carryover Limit**	**Annual Use Limit**	**Maximum AWD**	**3 year use limit**
Domestic and Stock	100%	0%	N/A	100%	N/A
Domestic and Stock [Domestic]	100%	0%	N/A	100%	N/A
Domestic and Stock [Stock]	100%	0%	N/A	100%	N/A
Local Water Utility	100%	0%	N/A	100%	N/A
Regulated River (General Security)	1 ML/Share	0.5 ML/Share	1 ML/Share	1 ML/Share	N/A
Regulated River (High Security)	1 ML/Share	0 ML/Share	N/A	1 ML/Share	N/A
Lower Namoi Regulated River Water Source					
Licence Category	**Account Limit**	**Carryover Limit**	**Annual Use Limit**	**Maximum AWD**	**3 year use limit**
Domestic and Stock	100%	0%	N/A	100%	N/A
Domestic and Stock [Domestic]	100%	0%	N/A	100%	N/A
Domestic and Stock [Stock]	100%	0%	N/A	100%	N/A
Local Water Utility	100%	0%	N/A	100%	N/A
Regulated River (General Security)	2 ML/Share	2 ML/Share	1.25 ML/Share	N/A	3 ML/share
Regulated River (High Security)	1 ML/Share	0 ML/Share	N/A	1 ML/Share	N/A
Regulated River (High Security) (Research)	1 ML/Share	0 ML/Share	N/A	1 ML/Share	N/A
Supplementary	N/A	0 ML/Share	N/A	1 ML/Share	N/A

Licenced General Security carryover into 2013-14 amounted to 304,802 megalitres in the Lower Namoi[3] and 857 megalitres in the Upper Namoi. This equates to approximately 123 per cent and 9 per cent of total share component respectively.

Opening Available Water Determinations (AWD) on 1 July 2013 were equivalent to 100 per cent of entitlement for domestic and stock, high security, local water utility and supplementary licence holders. The opening announcement for general security in the Upper Namoi was 1 megalitre per share. The first announcement of the season for General Security in the Lower Namoi was 0.0554 megalitres per share on 5 August 2013. A further (and final) announcement for the year was made on 5 September 2013 (0.0082 megalitres per share). Detailed information on the AWD's during 2013-14 is available in Note 2 of this GPWAR.

Water availability for general security in 2013-14 remained high. In the upper Namoi 2013-14 was the 4th consecutive year where availability was at maximum levels (100 per cent), while in the lower Namoi it was the 4th consecutive year with effective availability exceeding 100 per cent of issued share component. All other categories were maintained at maximum allowable allocations, which has been sustained since the system began management under the Water Management Act 2000

Water availability is presented in Figure 12 for the upper Namoi and Figure 13 for the lower Namoi.

[3] The Lower Namoi Regulated Water Source stretches from Keepit Dam, downstream to the Namoi River junction with the Barwon River. The Upper Namoi Regulated Water Source stretches from the Split Rock Dam on the Manilla River to the Namoi River upstream of Keepit Dam. The system combined storage volume of Keepit and Split Rock is available for sharing in the Available Water Determination process.

Figure 12: Upper Namoi Account Water Availability (Carryover + Available Water Determinations) [4][5][6]

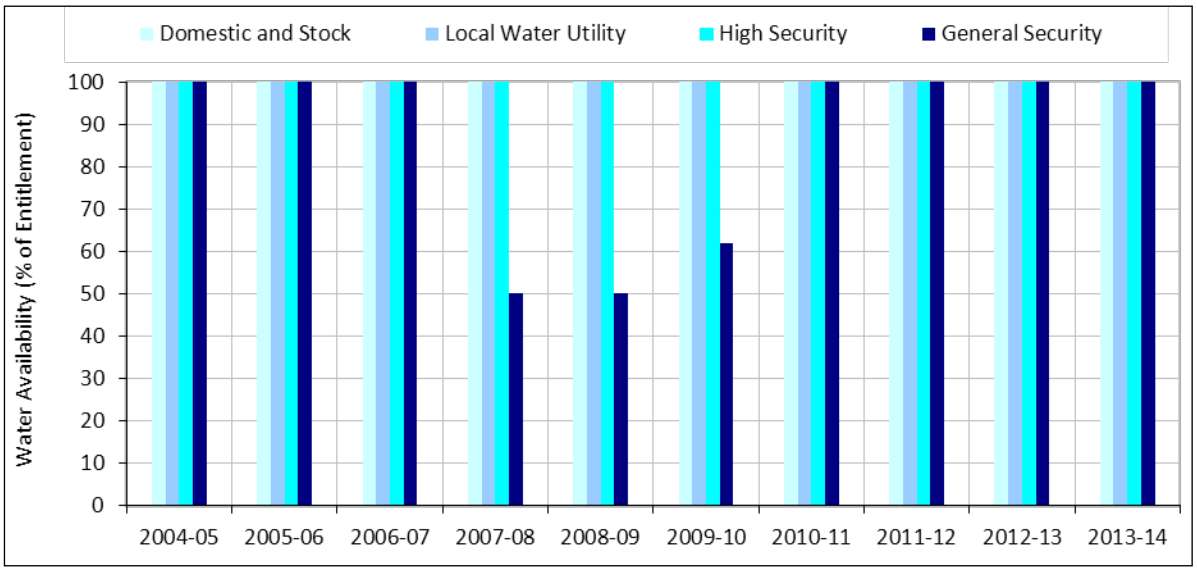
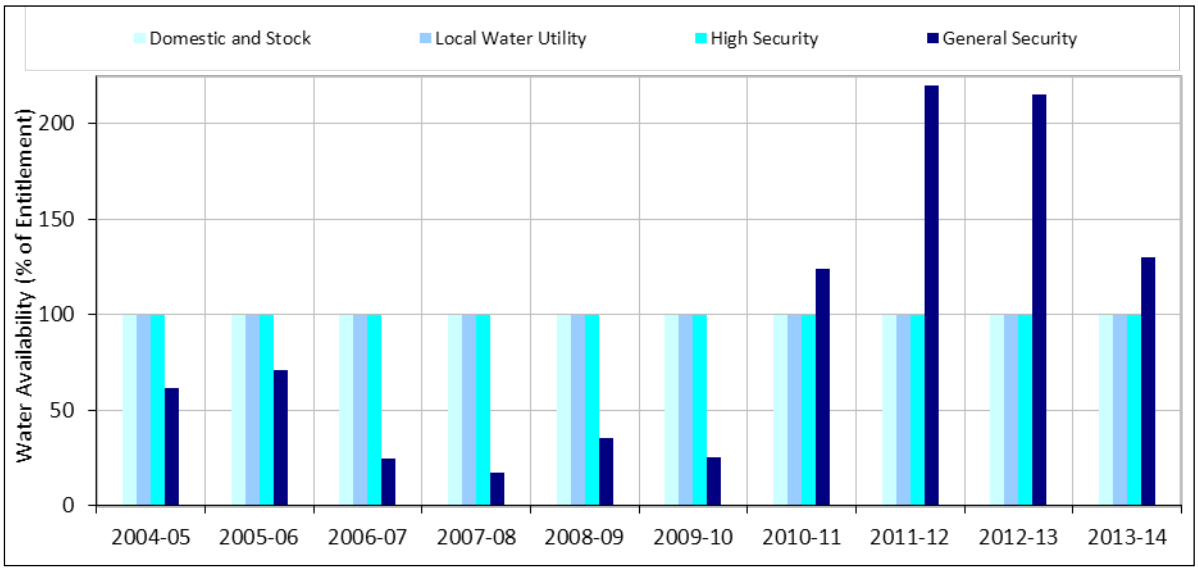


Figure 13: Lower Namoi Account Water Availability (Carryover + Available Water Determinations) [4][5][6][7]



Account usage (total for all licence categories) in 2013-14 was approximately 4,685 megalitres in the Upper Namoi and 266,856 megalitres in the Lower Namoi. The 2013-14 usage in the lower Namoi was the highest since the water sharing plan commenced (Figure 16), while in the upper Namoi, the annual usage was the third highest (Figure 15).

The total account usage in Namoi[8] of 266,855 megalitres is the second highest since the water sharing plan commenced. The high usage over the past 2 years shows an increasing trend in the average annual account usage (Figure 14). However, no comparisons with the long-term average extraction limit have been made as it requires hydrologic modelling and an assessment of flood plain harvesting usage (see Note 7).

[4] At the commencement of the water sharing plan (2004-05) water held in general security accounts was allowed to be brought forward as an opening balance.

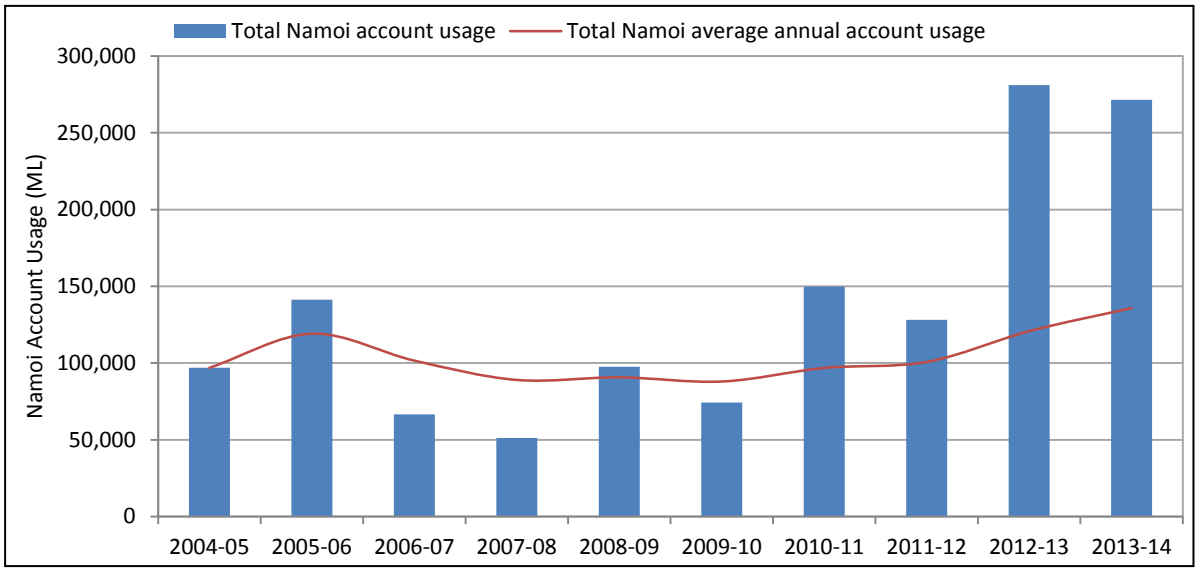
[5] Includes all access licences issues under the water sharing plan and therefore held environmental water.

[6] Water availability refers to the sum of water that was in holder accounts. It does not consider annual use limits and therefore was not necessarily all available for use in this water year.

[7] Supplementary licences have been excluded. Each year of the plan this licence category has been granted an available water determination of 100%, however access to this water is contingent on high flow events available. Actual usage information against this category of licence is available in Note 1 of this GPWAR.

[8] Total annual account usage in the Namoi includes all account usage in both the upper and lower Namoi which includes the supplementary use in the lower Namoi.

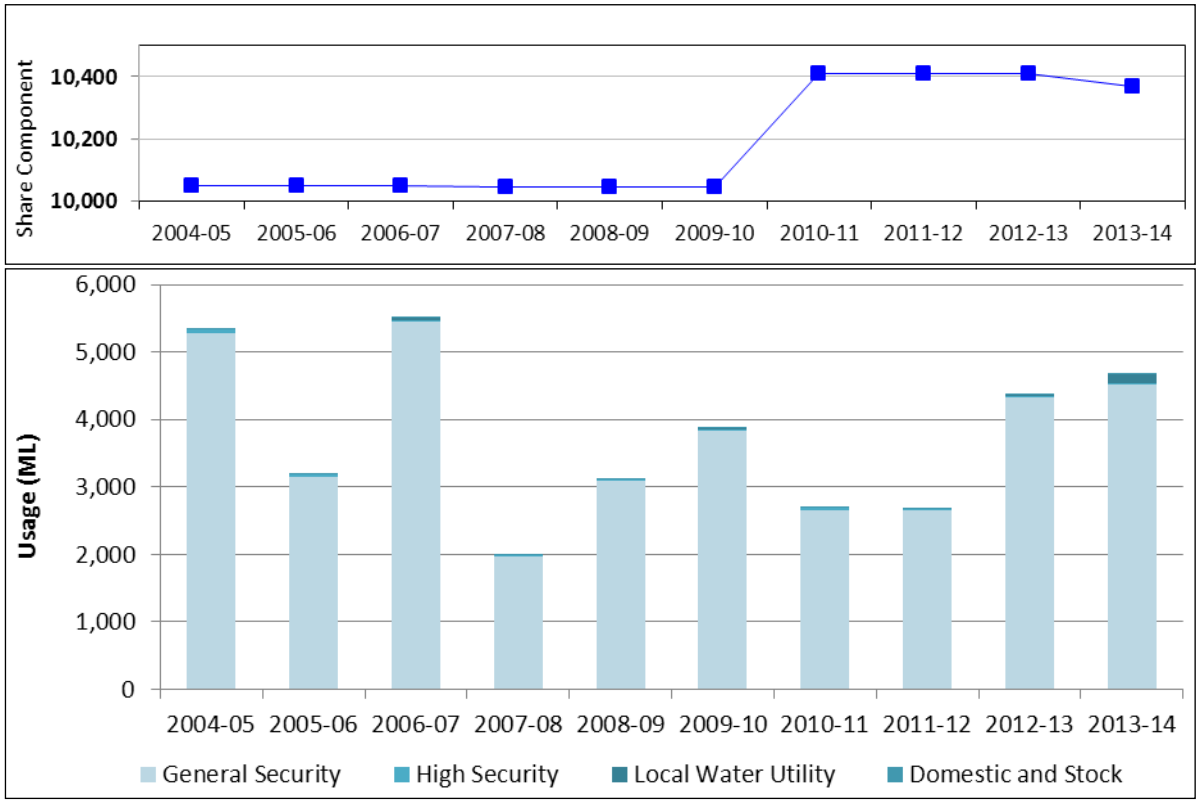
Figure 14: Namoi Average Annual Account Usage vs Annual Account Usage[9]



Trade continued the strong trend of water moving from the Upper Namoi to the Lower Namoi. A net of approximately 4,627 megalitres was traded from the upper to lower Namoi in 2013-14 (Figure 18 and Figure 19). Detailed trading reports are available in Note 5 of this GPWAR.

In 2013-14 two replenishment flow events were supplied to Pian creek (August 2013 and March 2014) totalling 1,089 megalitres. For additional information on replenishment flows refer to Note 19.

Figure 15: Upper Namoi total share component and usage since the commencement of the water sharing plan [10]



[9] Total annual account usage in the Namoi includes all account usage in both the upper and lower Namoi which includes the supplementary use in the lower Namoi.

[10] Includes all access licences issues under the water sharing plan and therefore held environmental water.

Figure 16: Lower Namoi total share component and usage since the introduction of the water sharing plan[11][12]

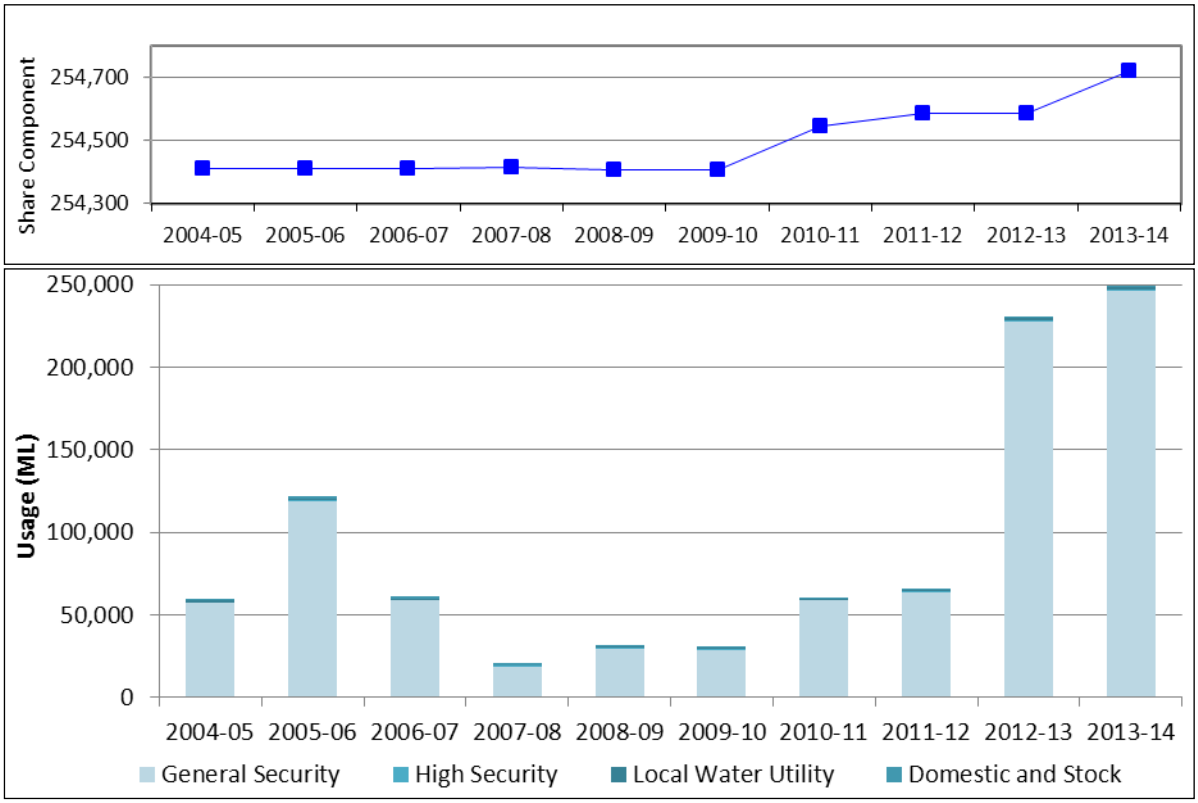
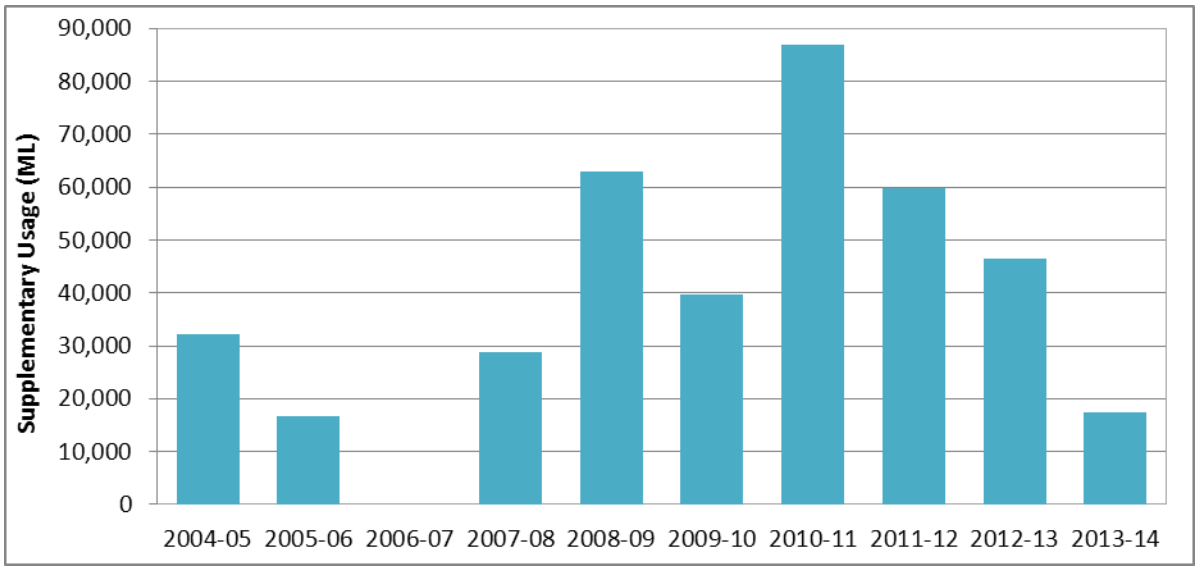


Figure 17: Lower Namoi supplementary licence usage since commencement of water sharing plan



[11] Supplementary licences have been excluded. Each year of the plan this licence category has been granted an available water determination of 100%, however access to this water is contingent on high flow events available. Actual usage information against this category of licence is available in Note 1 of this GPWAR.

[12] Includes all access licences issues under the water sharing plan and therefore held environmental water.

Figure 18: Upper Namoi trading summary

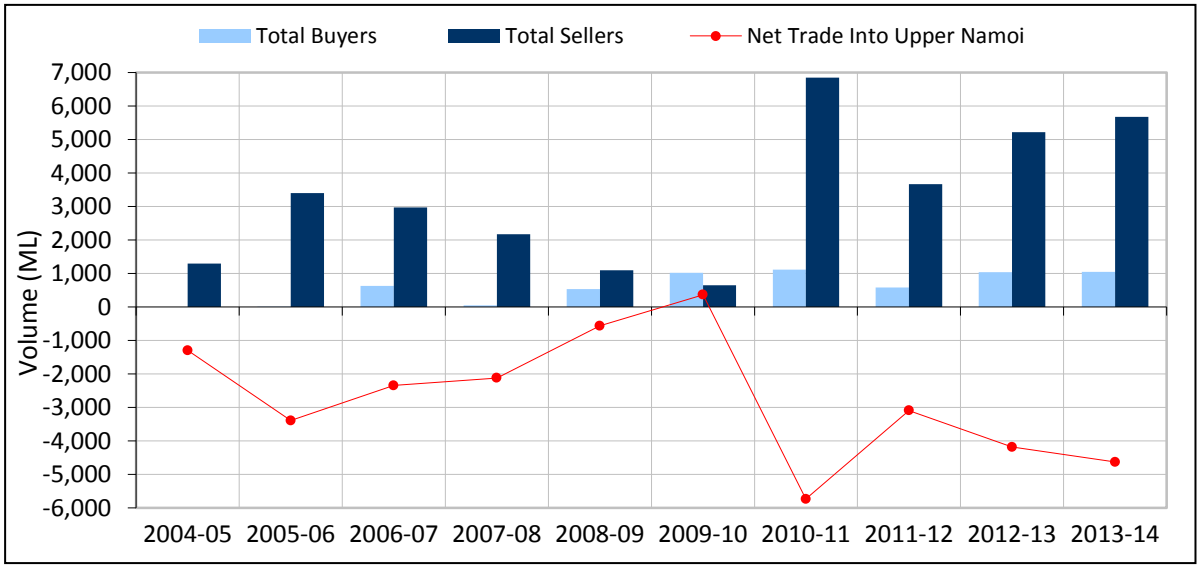
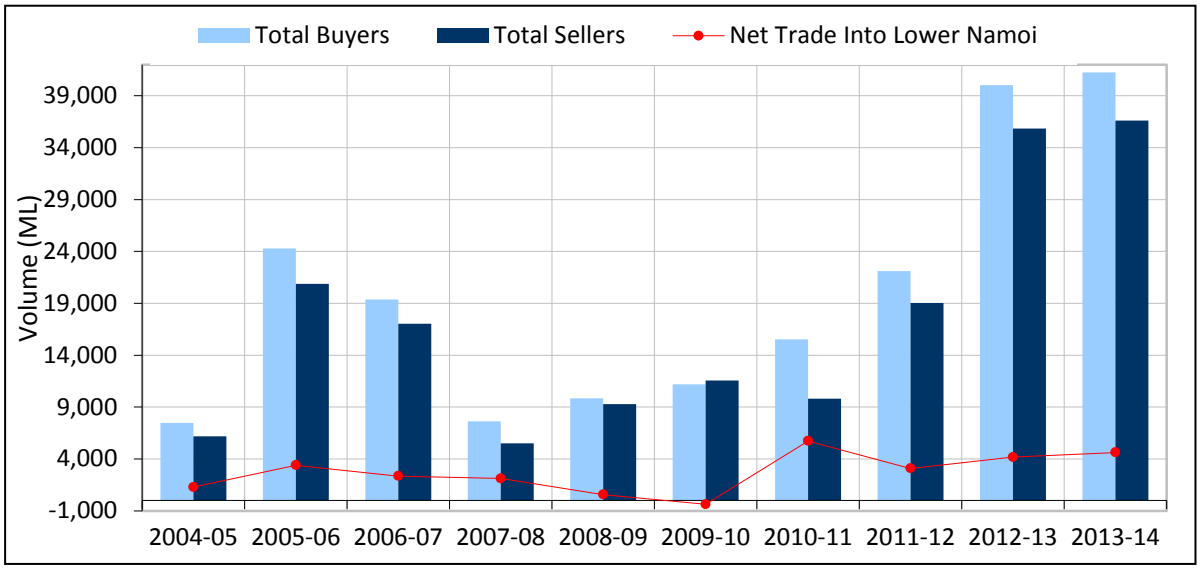


Figure 19: Lower Namoi Trading Summary[13]



Environmental water

There were only minor increases to the held environmental water holding in the Lower Namoi and no change in the Upper Namoi in 2013-14. Share component remained constant at 105 for general security in the Upper Namoi (Figure 20) and increased from 6,218 to 6,866 megalitres for general security in the Lower Namoi (Figure 21). In addition to this a High Security access licence of zero shares is held in both the Upper and Lower Namoi water sources. No usage of the held environmental water occurred in 2013-14. A detailed account balance for held environmental water is available in Note 6 of this GPWAR.

Targeted minimum environmental flows at Walgett were met in July and August 2013. Targeted environmental flows in June 2014, where partly met, with a shortfall occurring toward the end of the month. These flows are further detailed in Note 7 of this GPWAR.

A total of 24,585 megalitres, across three supplementary extraction events, was reserved for environmental benefits in line with the rules set out in the water sharing plan.

[13] Supplementary licence trade has been excluded from this plot.

Figure 20: Held environmental water share component in the Upper Namoi [14][15]

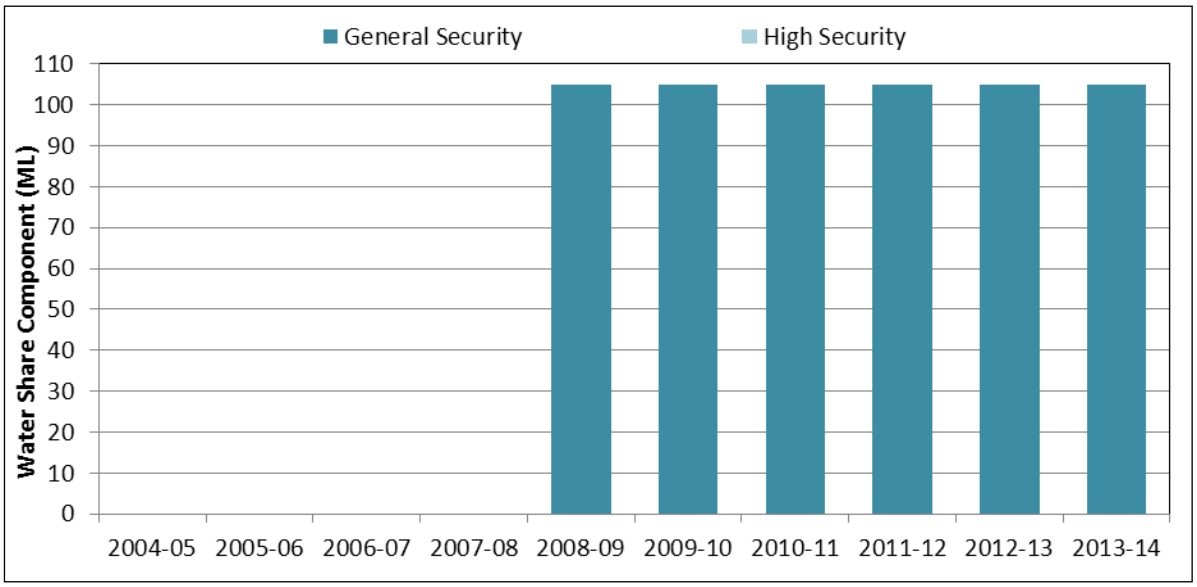
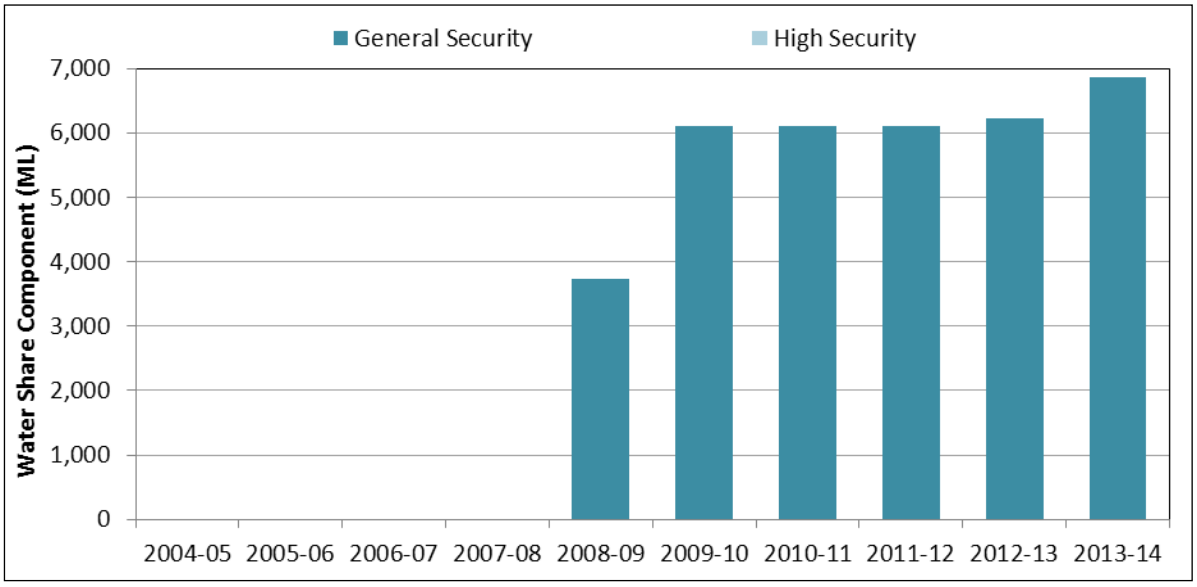


Figure 21: Held environmental water share component in the Lower Namoi [14][15]



[14] A high security licence of zero share component has been held since 2008-09.

[15] Held entitlements are presented at the conclusion of each water year (30 June).

Water Accounting Statements

Significant water accounting policies

The water accounting statements in this GPWAR have been prepared using an accrual basis of accounting. All figures are in megalitres (ML).

The 'Statement of Physical Flows' has been excluded for this GPWAR as all transactions have been presented in the statements 'Water Assets and Liabilities' and 'Changes in Water Assets and Water Liabilities'. A 'Physical Flow Diagram' that represents the physical movements of water has been included in order to provide a clearer depiction of those accounting processes associated with physical flow movement.

For generic information on how to interpret the NSW Office of Water GPWAR statements refer to the Guide to General Purpose Water Accounting Reports available for download on from the NSW Office of Water website.

Quantification of data

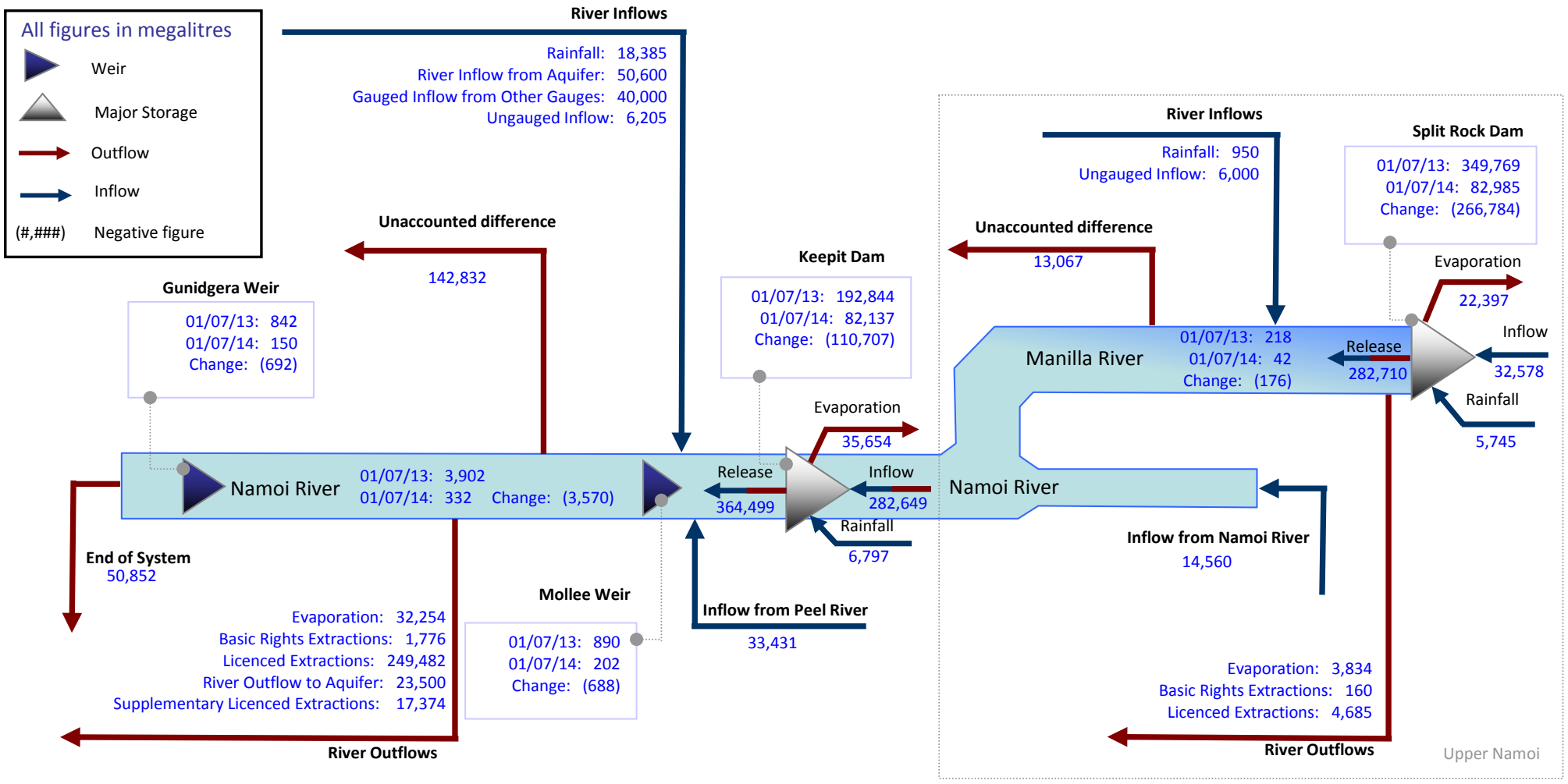
Data accuracy

It is important to recognise that the data used to account for water movement and management in the reporting entity has been obtained from a variety of sources and systems. The data ranges from observed values where a high accuracy would be anticipated through to modelled results and estimates where accuracy can be highly variable depending on a range of factors. To address the inconsistencies in accuracy and prevent misuse of the data in the accounts, all figures in the water accounting statements will be accompanied by an assessment of accuracy (Table 3).

Table 3: Water account data accuracy estimates key

Accuracy	Description
A1	+/- 0% Data is determined rather than estimated or measured. Therefore the number contains no inaccuracies.
A	+/- 10%
B	+/- 25%
C	+/- 50%
D	+/- 100%

2013-14 Namoi Physical Flows Mass Balance Diagram



Namoi catchment

Statement of Water Assets and Water Liabilities

As at 30 June 2014

( ) denotes negative

1. Surface Water Storage	Accuracy	Notes	30 June 2014	30 June 2013
Split Rock Dam	A	8	**82,985**	349,769
Keepit Dam	A	8	**82,137**	192,844
Gunidgera Weir	B	8	**150**	842
Mollee Weir	B	8	**202**	890
River		9		
Upper	B		**42**	218
Lower	B		**332**	3,902
Total Surface Water Storage (Asws)			**165,848**	548,465
Change in Surface Water Storage			**(382,617)**	**(213,018)**
2. Allocation Account Balance	**Accuracy**	**Notes**	**30 June 2014**	30 June 2013
Upper Namoi				
General Security	A1	1	**452**	857
Lower Namoi				
General Security	A1	1	**77,704**	304,802
Total Allocation Account Balance (Lsws)			**78,156**	305,658
Change in Allocation Account Balance			**(227,502)**	(145,330)
Net Surface Water Assets (Asws-Lsws)			**87,692**	242,807
Change in Net Surface Water Assets			**(155,115)**	(67,688)

Namoi catchment

Changes in Water Assets and Water Liabilities

For the year ended 30 June 2014 (1 of 2)

( ) denotes negative

Surface Water Storage Inflows	Accuracy	Notes	2013-2014	2012-2013
Split Rock Dam				
Inflow	A	10	**32,578**	48,551
Rainfall	B	11	**5,745**	10,224
Keepit Dam				
Inflow	A	10	**282,649**	123,205
Rainfall	B	11	**6,797**	14,857
River				
Upper Namoi				
River Inflow from Split Rock Releases	A	15	**282,710**	9,093
Gauged Inflow	A	13	**14,560**	119,932
Ungauged Inflow	C	14	**6,000**	6,000
Rainfall	C	12	**950**	1,037
Lower Namoi				
River Inflow from Keepit Releases	A	15	**364,499**	320,515
Inflow from Peel (Carroll Gap)	A	13	**33,431**	223,846
Gauged Inflow from Other Gauges	A	13	**40,000**	143,000
Ungauged Inflow	C	14	**6,205**	8,665
Rainfall	C	12	**18,385**	87,825
River Inflow from Aquifer	D	21	**50,600**	57,096
Total Surface Water Storage Increases (Isws)			**1,145,108**	**1,173,846**
Surface Water Storage Outflows	**Accuracy**	**Notes**	**2013-2014**	2012-2013
Split Rock Dam				
Evaporation	A	15	**22,397**	30,064
Release	B	11	**282,710**	9,093
Keepit Dam				
Evaporation	A	15	**35,654**	47,796
Release	B	11	**364,499**	320,515
River				
Upper Namoi				
Evaporation	C	11	**3,834**	3,886
End Of System (inflow to Keepit)	A	16	**282,649**	123,205
Basic Rights Extractions	C	18	**160**	160
Licenced extractions	A	17	**4,685**	4,366
Lower Namoi				
Evaporation	C	11	**32,254**	32,994
End of System Flow	A	16	**50,852**	225,854
River Outflow to Aquifer	D	21	**23,500**	25,276
Basic Rights Extractions	C	18	**1,776**	1,776
Licenced extractions	A	17	**266,856**	276,807
Total Surface Water Storage Decreases (Dsws)			**1,372,504**	1,101,793
Unaccounted Difference (Upper and Lower) (Usws)				
Upper Namoi	D	22	**13,067**	4,423
Lower Namoi	D	22	**142,832**	280,648
Net Surface Water Storage Inflow (Isws-Dsws-Usws)			**(382,617)**	(213,018)

Namoi catchment

Changes in Water Assets and Water Liabilities

For the year ended 30 June 2014 (2 of 2)

( ) denotes negative

Allocation Account Increases	Accuracy	Notes	2013-2014	2012-2013
Available Water Determinations (Upper Namoi)	A1	2		
Domestic and Stock			**92**	92
General Security			**8,868**	7,513
High Security			**80**	80
Local Water Utility			**515**	515
Available Water Determinations (Lower Namoi)	A1	2		
Domestic and Stock			**2,019**	2,019
General Security			**15,178**	80,123
High Security			**3,418**	3,418
High Security (Research)			**486**	486
Local Water Utility			**2,271**	2,271
Internal Trading - Buyers	A1	5		
Upper			**1,046**	1,038
Lower			**41,244**	40,027
Supplementary Water Demand – Lower Namoi	A	20	**17,374**	46,463
Total Allocation Account Increases (Iaa)			**92,591**	184,045

Allocation Account Decreases	Accuracy	Notes	2012-2013	2011-2012
Account Usage	A	3		
Upper Namoi				
Domestic and Stock			**9**	6
General Security			**4,513**	4,331
High Security			**25**	21
Local Water Utility			**139**	9
Lower Namoi				
Domestic and Stock			**1,137**	696
General Security			**246,497**	228,004
High Security			**145**	227
High Security (Research)			**472**	486
Local Water Utility			**1,232**	931
Supplementary			**17,374**	46,463
Account Forfeiture	A	1		
Upper Namoi				
Domestic and Stock			**81**	86
General Security			**133**	356
High Security			**55**	59
Local Water Utility			**376**	507
Lower Namoi				
Domestic and Stock			**859**	1,317
General Security			**627**	753
High Security			**364**	144
Local Water Utility			**1,039**	1,340
Internal Trading – Sellers	A1	5		
Upper Namoi			**5,673**	5,219
Lower Namoi			**36,617**	35,846
Water Order Debiting (Orders > Usage)	A	4		
Domestic and Stock			**24**	6
General Security			**2,454**	2,561
High Security (HS)			**234**	8
High Security (Research)			**14**	0
Licence Cancelleds			**2**	0
Trade Allocation Account Decreases (Daa)			**320,093**	329,374
Net Allocation Account Balance Increase (Iaa - Daa)			**(227,502)**	(145,330)
Change in Net Surface Water Assets (Isws-Dsws-Usws-Iaa+Daa)			**(155,115)**	(67,688)

Note Disclosures

Reconciliation and future prospect descriptions

( ) denotes negative

Reconciliation of change in net water asset to net change in physical water storage	2013-14	*2012-13*
	ML	*ML*
CHANGE IN NET SURFACE WATER ASSETS	(155,115)	(67,688)
Non-physical adjustments		
Net Change in Allocation Accounts	(227,502)	(145,330)
	(227,502)	**(145,330)**
NET CHANGE IN PHYSICAL SURFACE WATER STORAGE	**(382,617)**	**(213,018)**

Reconciliation of closing water storage to total surface water assets	30 June 2014	*30 June 2013*
	ML	*ML*
CLOSING WATER STORAGE		
Surface Water Storage	168,848	548,465
TOTAL SURFACE WATER ASSETS	**168,848**	**548,465**

Notes:
All figures can be derived from or found directly in the Water Accounting Statements of the General Purpose Water Accounting Report.

Water assets available to settle water liabilities and future commitments within 12 months of reporting date

( ) denotes negative

	(ML)	Note	(ML)
TOTAL WATER ASSETS AS AT 30 June 2013 (WA_{RP})			**165,848**
Plus: Water Asset increases within 12months of reporting date (WA_I)			
Minimum Storage Inflow	15,400	(a)	15,400
Less: Water assets not available to be accessed and taken or delivered within 12 months of reporting date. (WA_{NA})			
Storage Net Evaporation	25,000	(b)	
Operational Loss	32,000	(c)	
Future Commitments Delivery Loss 2013-14	14,100	(d)	
Essential Requirements 2014-15	27,000	(e)	
End of System Flows	5,000	16	
Minimum Storage Release	8,000	(f)	
Dead Storage	10,140	8	121,240
Water assets available to be accessed and taken or delivered within 12 months of reporting date.			**60,008**
Less: Water liabilities and future commitments expected to be settled within 12 months of the reporting date.			
Water Liabilities expected to be delivered within 12 months of reporting date. (WL_E)			
Surface Water Carryover	78,156	1	78,156
Future Commitments expected to be delivered within 12 months of reporting date. (FC)			
Indicative Allocations and Basic Rights		(g)	
Upper Namoi General Security	9,724	1	
Towns	2,421	1	
Domestic and Stock	2,111	1	
High Security	3,984	1	
Replenishment	14,000	(h)	
Basic Rights	1,936	18	34,176
			112,332
Surplus of available water assets over water liabilities and future commitments expected to be settled within 12 months of the reporting date. (SWA) $SWA = (WA_{RP} + WA_I - WA_{NA} - WL_E - FC)$		(i)	**(52,324)**

Notes:

(a) The statistical long term annual minimal inflow sequence to storages.

(b) This is an estimate of the annual impact the net effect of rainfall and evaporation has on the storages.

(c) This is the volume of water set aside to account for the losses encountered in the delivery of the water liabilities and future commitments.

(d) This is an allowance for loss set for those periods outside general irrigation releases when essential requirements are required to be supplied. It is assumed that basic rights will be delivered as part of this loss hence a reduction by a volume equivalent to basic rights (16,100 to 14,100).

(e) The Namoi catchment puts aside sufficient amount water asset to meet the essential requirements for two years. This figure represents the essential requirement in year two being made up of Towns, high security, stock and domestic, minimum storage releases, basic rights and estimated loss to deliver them.

(f) This is the combined minimum storage release from Keepit and Split Rock Dams.

(g) Indicative Allocation represents a starting allocation 100% for Upper Namoi general security, towns, domestic and stock and high security licences.

(h) Water set aside under the water sharing plan for up to two replenishment events down Pian Creek to Dundee Weir.

(i) In principle all water would be committed and hence this figure would be zero. However, a shortfall in the available water to meet the 2014/15 general security requirements resulted from catchment conditions being worse than the historical drought and higher than expected losses resulting from the transfer of water from Split Rock dam to Keepit Dam.

Note 1 – Allocation accounts

This note is reference for the volume held in the allocation accounts at the time of reporting and is also relevant for the various processes that occur to either increase or decrease an allocation account throughout the water year.

The volume of water that is in the licence allocation accounts at the time of reporting is a net balance for the relevant licence category and represents that water that can be carried forward to the next water year as dictated by the carryover rules in place for that year or required under the water sharing plan.

A negative number for the carryover figure indicates that more usage has occurred than has been allocated to the account, and the deficit must be carried forward to the next season.

Water that is in the accounts at the end of a water year but is not permitted to be carried over is forfeited and has been represented as a decrease in water liability.

The accounting presented is relevant to licence category and is therefore inclusive of licences held by environmental holders (these are also detailed separately in Note 6).

Data type

Derived from measured data

Policy

Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated Rivers Water Sources 2003

Available on the NSW Office of Water website at www.water.nsw.gov.au

Data accuracy

A1 – Nil inaccuracy +/- 0%

Providing agency

NSW Office of Water

Data source

State Water Corporation/NSW Office of Water – Water Accounting System (joint ownership)

Methodology

The carryover volume of water in the allocation account for each licence category is determined once all transactions and end of year forfeit rules have been applied. Below is list of typical transactions that can apply to an allocation account:

- Available Water Determination (AWD) (detailed in Note 2)
- Allocation account usage (detailed in Note 3)
- Forfeiture due to:
    - Unlimited, limited or no carryover being permitted (End of Year Forfeit)
    - Account limit breaches
    - Cancellation of licence
- Trade of allocation water between accounts (detailed in Note 5)
- Determined carryover volume

Additional information

The tables on the following page provide a balanced summary of the water allocation accounts for each category of access licence. Below is a description of each of the table components.

Table 4: Explanatory information for allocation account summary

Heading		Description
Share		This is the total volume of entitlement in the specific licence category.
Opening balance		The volume of water that has been carried forward from previous years allocation account.
AWD – Available water determination		The total annual volume of water added to the allocation account as a result of allocation assessments. This figure includes additional AWD made as a result of a storage spill reset as defined in the water sharing plan.
Licences	**New**	Increase in account water as a result of the issuing of a new licence.
	Cancelled	Decrease in account water as a result of a licence cancellation where account balance has not been traded to another licence.
Assignments	**In**	Increase in account water as a result of temporary trade in.
	Out	Decrease in account water as a result of temporary trade out.
Account usage		Volume of water that is extracted or diverted from the river and is accountable against the access licence allocation
Over Order Debit		As a result of water order debiting being applied in a water source water ordered in excess of usage can be debited against an access licence.
Forfeits	**During Year**	Account water forfeited throughout the year as a result of the accounting rules specified in the water sharing plan. Forfeited water may occur due to account limits being reached, conversions between licence categories and various types of other licence dealings.
	End of year forfeit	Account water that is forfeited at the end of the water year as a result of carryover rules that restrict the carry forward volume.
End of year balance	**Available**	Account balance that is available to be taken at the conclusion of the water year.
	Not Available	Water in accounts that is not available to be taken as a result of annual use limits that are applied to accounts.
Carry forward		This represents the account water that is permitted to be carried forward into the next water year as determined by the carryover rules.
( )		Negative figures are shown in red brackets

Table 5: Allocation account balance summary for the Upper Namoi regulated river 2013-14

Category	Share	Opening Balance	AWD	Licences		Assignments		Account Usage	During Year Forfeit	End of Year Balance		End of Year Forfeit	Carry Forward
				New	Cancelled	In	Out			Available	Not Available		
Domestic and Stock	74	0	76	0	2	0	0	1	0	73	0	73	0
Domestic and Stock [Domestic]	11	0	11	0	0	0	0	3	0	8	0	8	0
Domestic and Stock [Stock]	5	0	5	0	0	0	0	5	0	0	0	0	0
Local Water Utility	515	0	515	0	0	0	0	139	0	376	0	376	0
Regulated River (General Security)	9,685	857	9,724	0	0	1,046	5,673	4,513	856	586	0	133	452
Regulated River (High Security)	80	0	80	0	0	0	0	25	0	55	0	55	0

Table 6: Allocation account balance summary for the Lower Namoi regulated river 2013-14

Category	Share	Opening Balance	AWD	Licences		Assignments		Account Usage	Over Order Debit	During Year Forfeit	End of Year Balance		End of Year Forfeit	Carry Forward
				New	Cancelled	In	Out				Available	Not Available		
Domestic and Stock	1,745	0	1,745	0	0	0	0	1,006	24	0	716	0	716	0
Domestic and Stock [Domestic]	17	0	17	0	0	0	0	7	0	0	10	0	10	0
Domestic and Stock [Stock]	257	0	257	0	0	0	0	124	0	0	133	0	133	0
Local Water Utility	2,271	0	2,271	0	0	0	0	1,232	0	0	1,039	0	1,039	0
Regulated River (General Security)	246,527	304,802	15,178	0	0	41,244	33,942	246,497	2,454	627	45,415	32,289	0	77,704
Regulated River (High Security)	3,418	0	3,418	0	0	0	2,675	145	234	0	364	0	364	0
Regulated River (High Security)(Research)	486	0	486	0	0	0	0	472	14	0	0	0	0	0
Supplementary Water	115,479	0	115,480	0	0	9	9	17,374	0	0	98,106	0	98,106	0

Note 2 – Available water determination (AWD) (allocation announcement)

This is the process by which the regulated surface water asset available for use within the regulated system is determined and shared. The process calculates the volume of water that is to be added to an individuals licence allocation account. Announcements of allocations are made on a seasonal basis - usually corresponding with the financial year and are updated on a regular basis or following significant inflow events. Under the *Water Management Act 2000* the announcements are termed available water determinations.

Data type

Derived from measured data.

Policy

Water Management Act 2000 (NSW).

- Chapter 3 – Part 2 Access Licences.
    - Clause 59 – Available Water Determinations.

Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated Rivers Water Sources 2003

- Part 8 – Limits to the availability of water
    - Division 2 – Available Water Determinations.

Available on the NSW Office of Water website at www.water.nsw.gov.au

Data accuracy

A1 – Nil inaccuracy +/- 0%

Providing agency

NSW Office of Water.

Data source

State Water/NSW Office of Water – Water Accounting System (Joint ownership of system).

Available Water Determination Register - NSW Office of Water website at www.water.nsw.gov.au

Methodology

The available water determination applies different concepts and rules depending on the water source.

In the Lower Namoi Regulated Water Source AWDs are calculated based on a concept of continuous accounting which assesses the resource (water) contained in the headwaters storage, periodically updating projections and distributing the regulated (stored) resource available. All projected requirements are for two (2) years from the date of the assessment. It is important to note that under continuous accounting the AWDs are based on the actual volume of water in storage at the time of the resource assessment and does not account for sequences of future inflows.

The Upper Namoi Regulated Water Source AWDs are calculated using annual accounting concepts with the exception that headwater inflows are not considered and calculations are based on the resource held at the point of assessment. This is due to the fact that Split Rock storage is a shared resource for both the upper and lower regulated water sources. Under the annual accounting once allocation for essential requirements and high security is secured at 100 per cent general security is allocated water according to the volume held in Split Rock dam as defined in the following table:

Table 7: General security AWD announcements for the Upper Namoi Regulated River Water Source

Per Unit Share (ML)	Volume of water held in Split Rock Dam during the water year (per cent of full supply)
0.0	<5%
0.5	5% - 8%
0.6	8% - 10%
1.0	>10%

Assessments in all water sources involve the assessment of the effective storage, being the available storage volume after storage losses are accounted for. This is to account for the fact that storage losses cannot be controlled by a management rule and, therefore, must be provided for first. Once this has been considered, essential supplies are allocated water as the highest priority followed by the allocating of any remaining uncommitted water in proportion to the amount of entitlement in the remaining resource categories.

The essential supplies mentioned above consist of items such as stock and domestic requirements, Local Water Utilities (e.g. town water supplies, industrial use), High Security (permanent plantings e.g. orchards, vineyards), end of system flow requirement resulting from the system operation and minimum storage releases.

The volume of water distributed to licence categories is expressed as either a volume per share or as a percentage of share component depending on the category of licence. The following table details each licence category and how it is announced.

Table 8: Access Licence category announcement type

Licence category	Announcement type
General Security	Volume per Share
High Security	Volume per Share
Domestic and Stock*	Percent of Share Component
Local Water Utility	Percent of Share Component
* Domestic and Stock consists of three sub categories: Domestic and Stock, Domestic and Stock (Domestic) and Domestic and Stock (Stock). High Security consists of two sub categories: High Security and High Security (Research).	

It should be noted that the AWD for supplementary licence accounts is a separate process and is not dependent on water asset available. It is made once at the start of the year and unless there is a management change due to the growth in use strategy it is maintained at the maximum value prescribed in the plan generally one megalitres per share (equivalent to 100 per cent of entitlement). Therefore, it is not considered to create a liability on the system and is only considered in terms of an extraction that reduces the water asset.

Additional information

The following pages contain the allocation summary reports for 2013-14. Below is a table containing report notes to help interpret the report.

Table 9: Allocation summary report notes

Heading	Description
AWD date	Date that Available water determination was announced and water was credited to accounts
Opening	Remaining allocation account balances at the conclusion of the previous season that is allowed to be carried forward to this season.
AWD announced	Actual available water determination announcement made to each licence category
Share component (entitlement)	Sum of the licensed volume of water within the licence category on the announcement date.
Allocation volume	Volume of water credited to accounts within a licence category as a result of the announcement made.
Allocation cum. volume	Cumulative total of the announced volumes for the water year and licence category.
Allocation per cent of share	This is the announced volume expressed as a percentage of the entitlement applicable on the particular date.
Allocation cum. per cent	This is the cumulative announced volume expressed as a percentage of the entitlement applicable on the particular date.
Balance account volume	Sum of the total volume of water that has been added to accounts in the water year. This volume is the sum of allocation volume plus the opening account volume.
Balance per cent of share	Balance total expressed as a percentage of the entitlement

Table 10: Allocation announcements for the Upper Namoi regulated river water source 2013-14

Date	Individual Announcement	Share Component	Allocation Volume (ML)	Cumulative Volume (ML)	Allocation Volume (%)	Cumulative Volume (%)	Balance Available (ML)	Balance Not Available (ML)	Balance Total (ML)	Balance Available (%)	Balance Total (%)
UPPER NAMOI REGULATED RIVER WATER SOURCE											
DOMESTIC AND STOCK											
1-Jul-13	Opening	76					0	0	0	0.0%	0.0%
1-Jul-13	AWD 100.0 %	76	76	76	100.0%	100.0%	76	0	76	100.0%	100.0%
DOMESTIC AND STOCK[DOMESTIC]											
1-Jul-13	Opening	11					0	0	0	0.0%	0.0%
1-Jul-13	AWD 100.0 %	11	11	11	100.0%	100.0%	11	0	11	100.0%	100.0%
DOMESTIC AND STOCK[STOCK]											
1-Jul-13	Opening	5					0	0	0	0.0%	0.0%
1-Jul-13	AWD 100.0 %	5	5	5	100.0%	100.0%	5	0	5	100.0%	100.0%
LOCAL WATER UTILITY											
1-Jul-13	Opening	515					0	0	0	0.0%	0.0%
1-Jul-13	AWD 100.0 %	515	515	515	100.0%	100.0%	515	0	515	100.0%	100.0%
REGULATED RIVER (GENERAL SECURITY)											
1-Jul-13	Opening	9,724					857	0	857	8.8%	8.8%
1-Jul-13	AWD 1.0 ML per Share	9,724	9,724	9,724	100.0%	100.0%	10,581	0	10,581	108.8%	108.8%
REGULATED RIVER (HIGH SECURITY)											
1-Jul-13	Opening	80					0	0	0	0.0%	0.0%
1-Jul-13	AWD 1.0 ML per Share	80	80	80	100.0%	100.0%	80	0	80	100.0%	100.0%

Table 11: Allocation announcements for the Lower Namoi regulated river water source 2013-14

Date	Individual Announcement	Share Component	Allocation Volume (ML)	Cumulative Volume (ML)	Allocation Volume (%)	Cumulative Volume (%)	Balance Available (ML)	Balance Not Available (ML)	Balance Total (ML)	Balance Available (%)[16]	Balance Total (%)[17]
LOWER NAMOI REGULATED RIVER WATER SOURCE											
DOMESTIC AND STOCK											
1-Jul-13	Opening	1,745					0	0	0	0.0%	0.0%
1-Jul-13	AWD 100.0 %	1,745	1,745	1,745	100.0%	100.0%	1,745	0	1,745	100.0%	100.0%
DOMESTIC AND STOCK[DOMESTIC]											
1-Jul-13	AWD 100.0 %	17	17	17	100.0%	100.0%	17	0	17	100.0%	100.0%
1-Jul-13	Opening	17					0	0	0	0.0%	0.0%
DOMESTIC AND STOCK[STOCK]											
1-Jul-13	Opening	257					0	0	0	0.0%	0.0%
1-Jul-13	AWD 100.0 %	257	257	257	100.0%	100.0%	257	0	257	100.0%	100.0%
LOCAL WATER UTILITY											
1-Jul-13	Opening	2,271					0	0	0	0.0%	0.0%
1-Jul-13	AWD 100.0 %	2,271	2,271	2,271	100.0%	100.0%	2,271	0	2,271	100.0%	100.0%
REGULATED RIVER (GENERAL SECURITY)											
1-Jul-13	Opening	246,488					278,429	26,373	304,802	113.0%	123.7%
5-Aug-13	AWD 0.0554 ML per Share	246,488	13,209	13,209	5.4%	5.4%	285,489	32,521	318,011	115.8%	129.0%
5-Sep-13	AWD 0.0082 ML per Share	246,488	1,969	15,178	0.8%	6.2%	284,968	35,011	319,979	115.6%	129.8%
REGULATED RIVER (HIGH SECURITY)											
1-Jul-13	Opening	3,418					0	0	0	0.0%	0.0%
1-Jul-13	AWD 1.0 ML per Share	3,418	3,418	3,418	100.0%	100.0%	3,418	0	3,418	100.0%	100.0%
REGULATED RIVER (HIGH SECURITY)[RESEARCH]											
1-Jul-13	Opening	486					0	0	0	0.0%	0.0%
1-Jul-13	AWD 100.0 %	486	486	486	100.0%	100.0%	486	0	486	100.0%	100.0%
SUPPLEMENTARY WATER											
1-Jul-13	Opening	115,479					0	0	0	0.0%	0.0%
1-Jul-13	AWD 1.0 ML per Share	115,479	115,480	115,480	100.0%	100.0%	115,480	0	115,480	100.0%	100.0%

[16] While accounts can be maintained at a volume up to 2 ML/share multiplied by the share component annual extractions at an individual licence level are limited to 1.25 ML/share multiplied by the share component plus an allocation assignment in to the access licence account while, over a 3 year consecutive period they are restricted to 3 ML/share multiplied by the share component plus the volume of allocation assignment in to the access licence account during the 3 year period.

[17] Despite general security accounts being limited to a volume up to 2 ML/share multiplied by the share component at any point in time usage can mean that the volume of water put into accounts within a year can exceed 200% of entitlement.

Note 3 – Allocation account usage

This is the volume of water that is extracted, diverted or measured as usage and is accountable against an access licence issued under the water sharing plan. This figure excludes that water accounted as over order debit which is accounted for separately (see Note 4).

Data type

Measured/administration data

Policy

Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated Rivers Water Sources 2003

Available on the NSW Office of Water website at www.water.nsw.gov.au

Data accuracy

A – Estimated in the range +/- 10%

Providing agency

NSW Office of Water

Data source

State Water/NSW Office of Water – Water Accounting System (Joint ownership of system).

Methodology

Usage information is determined by either on-farm meters that measure extraction, gauges on diversion works or orders/releases when the volume cannot be effectively metered, such as an environmental watering event.

Meter readings are collected for individual licence holders at intervals during the year and converted via a calibration factor to a volume of water extracted. Water diverted from the river is measured by recording the height at either the gauge or weir with the volume diverted being derived by passing these heights through a rating table. With potentially multiple categories of access licences being extracted through the same pumps additional information and methodologies are required to separate use under the various licence categories. Below is a description of these:

- Based on periods of announcement – during periods of supplementary water announcements extractions can be debited against the supplementary water licences
- Usage based on water orders – users place orders for water against an access licence and usages are debited against accounts in proportion to the orders placed.
- Licence category apportionment – if no water orders are available water extracted is apportioned against categories of access licence in order of priority as set out in the table below. The prioritising is based on the nature of and rules around each of the licence categories.

The following table provides the order in which extractions are apportioned to access licence categories in the water accounting system. This is a generic list where not all categories will necessarily appear in this GPWAR. There are also various sub categories of licence associated with some of the categories.

Table 12: Licence category metered usage apportionment table

Priority	Surface water
1	Supplementary
2	Uncontrolled Flow
3	Domestic and Stock
4	Regulated River High Security
5	Regulated River General Security
6	Conveyance
7	Local Water Utility
8	Major Water Utility

Table 13: Account usage summary 2013-14

Category	Account usage (ML)	
	Lower Namoi	Upper Namoi
Domestic and Stock	1,006	1
Domestic and Stock [Domestic]	7	3
Domestic and Stock [Stock]	124	5
Local Water Utility	1,232	139
General Security	246,497	4,513
High Security	145	25
High Security (Research)	472	NA
Supplementary Water	17,374	NA

Note 4 – Water order debiting

Currently in the Lower Namoi regulated water source the allocation accounts are managed using a water order debiting approach. Accounting under this system defines that the accounts are reduced by the greater of:

- the volume of water extracted and
- the volume of water ordered for extraction against an access licence

Therefore, the volume appearing in statements against the line item water order debiting reflects the amount of water ordered against a category of licence that is in excess of the physical extraction that occurred.

Data type

Measured/calculated

Policy

Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2003

- Part 9 – Rules for managing access licences.
  Division 2 – Water allocation account management.
  - Clause 43 – Volume taken under access licences.

Available on the NSW Office of Water website at: www.water.nsw.gov.au.

Data accuracy

Estimated in the range +/- 10%.

Providing agency

NSW Office of Water.

Data source

State Water/NSW Office of Water – Water accounting system (joint ownership of system).

Methodology

Over order debiting is a required component of balancing the allocation accounts detailed in Note 1. The over order debit component is calculated by analysing the recorded extractions against orders for the corresponding measurement period. That is, if metered usage is collected monthly then the corresponding monthly orders are compared and any orders that are in excess the usage are recorded as over order debit.

Note 5 – Internal trading (allocation assignments)

This represents the temporary trading (allocation assignments) of water between allocation accounts within the regulated Upper and Lower Namoi water sources.

Data type

Administration

Policy

Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated Rivers Water Sources 2003

- Part 10 Access licence dealing rules
    - Clause 51 rules relating to constraints within a water source
    - Available on the NSW Office of Water Website at www.water.nsw.gov.au

Data accuracy

A1 – Nil inaccuracy +/- 0%

Providing agency

NSW Office of Water

Data source

State Water/NSW Office of Water – Water Accounting System (joint ownership of system).

Methodology

Trading is permitted between certain categories of access licences and between certain water sources. This is detailed in the water sharing plan or stipulated under the licence holder's conditions.

The net internal trade for each licence category is zero for a water year. As such, trades occur as both a water liability decrease (sellers of water) and a water liability increase (buyers of water).

Additional information

The following table shows the internal trading figures between licence categories. All figures represent a volume in megalitres.

Table 14: 2013-14 Upper and Lower Namoi catchment allocation assignments summary

			Buyer			Total
		Water Source	Lower Namoi		Upper Namoi	
Seller	Water Source	Licence Category	General Security	Supplementary	General Security	
	Lower Namoi	General Security	33,942			**33,942**
		High Security	2,675			**2,675**
		Supplementary		9		**9**
	Upper Namoi	General Security	4,627		1,046	**5,673**
Total					**41,244**	**9**

Note 6 – Held environmental water

This represents that environmental water that is held as part of a licensed volumetric entitlement. These licences are either purchased on the market by environmental agencies or issued as a result of water savings achieved through investment by those relevant agencies.

These licences are held within the same licence categories as all other water access licences hence are subject to the same operating rules. Therefore they are subject to the following key rules:

- Available Water Determinations (AWD) for their share of the entitlement to be added to accounts
- Carryover rules hence the forfeiting of unused water that cannot be carried over
- Provide water orders prior to use.

These licences are used to provide environmental benefit and outcomes to the catchment by either providing water to, or supplementing water requirements of, a specific environmental events or incidents.

Measured

Policy

Water Management Act 2000

- Dealings with access licences (Division 4)
    - 71G Assignment of water allocations between access licences

Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated Rivers Water Sources 2003

Available on the NSW Office of Water Website at www.water.nsw.gov.au

Data accuracy

A1 – Estimated in the range +/- 10%

Providing agency

NSW Office of Water

Data source

State Water/NSW Office of Water – Water Accounting System (Joint ownership of System).

Available Water Determination Register - NSW Office of Water website at www.water.nsw.gov.au

Methodology

The water held for the environment represents a volume of water in corresponding allocation accounts. This allocation account represents the sum of the remaining volume of held environmental water at the conclusion of the water year once all transactions and forfeit rules have been applied to the accounts. These environmental balances are at the licence category level and represent the water that can be carried forward for use in the next year. Below is list of typical transactions that can apply to an environmental allocation account:

- Available Water Determination (AWD) (detailed in Note 2)
- Allocation account usage (detailed in Note 3)
- Forfeiture due to:
    - Unlimited, limited or no carryover being permitted (end of year forfeit)
    - Account limit breaches

- Cancellation of licence

- Trade of allocation water between accounts
- Determined carryover volume

In addition the trade and purchase of environmental water is tracked to capture the movement of environmental entitlement both in number of entitlements, and volume.

Additional information

The table on the following page provides a summary of held environmental water for 2013-14.

Table 15: Explanatory information for Environmental Account Summary

Heading		Description
Share		This is the total volume of entitlement in the specific licence category.
Opening balance		The volume of water that has been carried forward from previous years allocation account.
AWD – Available water determination		The total annual volume of water added to the allocation account as a result of allocation assessments. This figure includes additional AWD made as a result of a storage spill reset as defined in the water sharing plan.
Licences	**New**	Increase in account water as a result of the issuing of a new licence.
	Cancelled	Decrease in account water as a result of a licence cancellation where account balance has not been traded to another licence.
Assignments	**In**	Increase in account water as a result of temporary trade in.
	Out	Decrease in account water as a result of temporary trade out.
Account usage		Volume of water that is extracted or diverted from the river and is accountable against the access licence allocation
Over Order Debit		As a result of water order debiting being applied in a water source water ordered in excess of usage can be debited against an access licence.
Forfeits	**During Year**	Account water forfeited throughout the year as a result of the accounting rules specified in the water sharing plan. Forfeited water may occur due to account limits being reached, conversions between licence categories and various types of other licence dealings.
	End of year forfeit	Account water that is forfeited at the end of the water year as a result of carryover rules that restrict the carry forward volume.
End of year balance	**Available**	Account balance that is available to be taken at the conclusion of the water year.
	Not Available	Water in accounts that is not available to be taken as a result of annual use limits that are applied to accounts.
Carry forward		This represents the account water that is permitted to be carried forward into the next water year as determined by the carryover rules.
( )		Negative figures are shown in red brackets

Table 16: Upper Namoi regulated water source environmental account balance summary 2013-14

Category	Share	Opening Balance	AWD	Licences		Assignments		Account Usage	Over Order Debit	During Year Forfeit	End of Year Balance		End of Year Forfeit	Carry Forward
				New	Cancelled	In	Out				Available	Not Available		
General Security	105	0	105	0	0	0	105	0	0	0	0	0	0	0
Supplementary water	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 17: Upper Namoi regulated water source environmental holding summary 2013-14

Category	# Licences 30 June 2013	Share component 30 June 2013	# Licences 30 June 2014	Share component 30 June 2014	Share component difference
General Security	1	105	1	105	0
Supplementary water	1	0	1	0	0

Table 18: Lower Namoi regulated water source environmental account balance summary 2013-14

Category	Share	Opening Balance	AWD	Licences		Assignments		Account Usage	Over Order Debit	During Year Forfeit	End of Year Balance		End of Year Forfeit	Carry Forward
				New	Cancelled	In	Out				Available	Not Available		
General Security	6,866	5,559	396	0	0	105	0	0	0	0	6,059	0	0	6,059
High Security	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 19: Lower Namoi regulated water source environmental holding summary 2013-14

Category	# Licences 30 June 2013	Share component 30 June 2013	# Licences 30 June 2014	Share component 30 June 2014	Share component difference
General Security	2	6218	2	6,866	648
High Security	1	0	1	0	0

Table 20: Namoi environmental trade in 2013-14.

Licence Catergory		Lower Namoi
		General Security
Upper Namoi	General Security	105

Note 7 – Environmental provisions

Minimum end of system flow target

This refers to the maintenance of a flow rate for that leaves the Namoi River in line with the end of system environmental flow provision as specified in the Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2003. The rule states that in the months of June, July and August, a minimum daily flow which is equivalent to 75 per cent of the natural 95th percentile daily flow for each month, shall be maintained in the Namoi River at Walgett (gauging station number 419091). As a volumetric target this is equivalent to 21, 24 and 17 megalitres per day respectively. The rule is not applicable when the sum of the water stored in Keepit Dam and Split Rock Dam is less than 120,000.

Long-term average extraction limit (LTAEL)

By limiting long-term average extractions to an estimated 238,000 megalitres per year this Plan ensures that approximately 73 per cent of the long-term average annual flow in the water source (estimated to be 870,000 megalitres per year) will be preserved and will contribute to the maintenance of basic ecosystem health.

Data type

Derived from measured data

Policy

Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2003

- Part 3 – Environmental Water Provisions.
  Division 2 – Water allocation account management.
  - Clauses 13, 14 – Planned Environmental Water.

Available on the NSW Office of Water website at: www.water.nsw.gov.au.

Data accuracy

A – Estimated in the range +/- 10%

Providing agency

NSW Office of Water

Data source

NSW Office of Water – HYDSTRA

Methodology

For the minimum end of system flow target: Walgett daily flows are calculated by processing a gauged stream level through a rating table that converts it to a flow rate. These Walgett flows are then compared to the target flows to check for compliance against the water sharing plan rules.

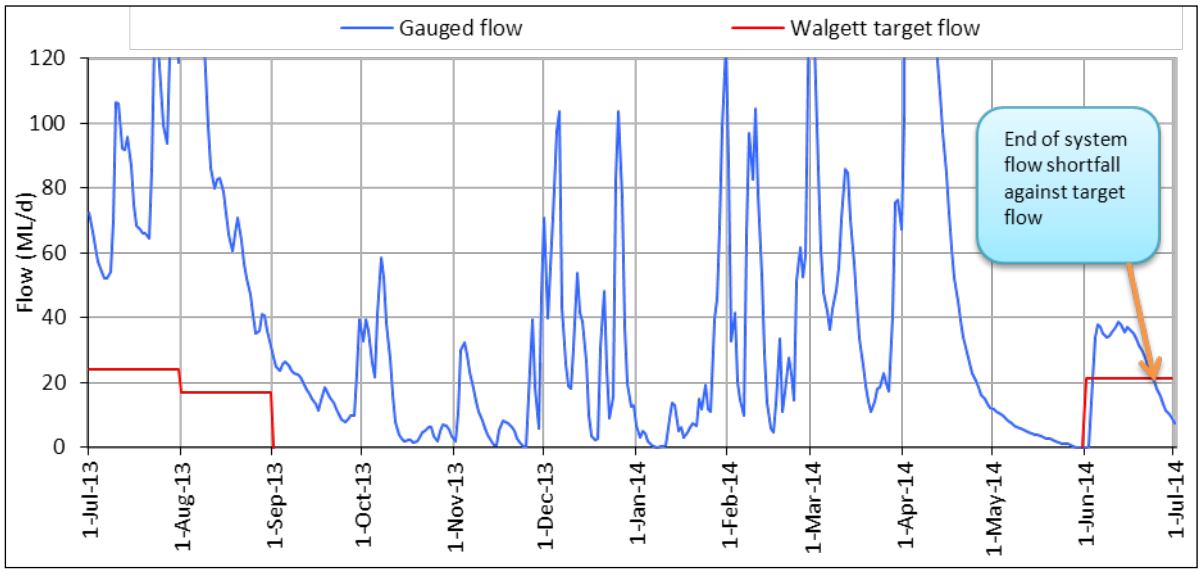
Long term average extraction limit: The assessment against the LTAEL shall include the sum of all licensed usage (including held environmental), basic rights extractions, net trade out of the water source and water taken under flood plain harvesting rights.

Additional Information

Performance against minimum end of system flow target

The following graph provides details of the daily flows in comparisons to the daily flow targets at Walgett for 2013-14. As can be seen from the graph flow targets were maintained in July and August 2013 in accordance with the water sharing plan. In June 2014 targets were not met towards the end of the month as available resources declined.

Figure 22: Walgett Flow comparison with targets 2013-14



Performance against long-term average extraction limit

Performance against long term extraction limit is to be undertaken at the conclusion of each water year, using the hydrologic model that is approved by the NSW Office of Water for assessing long term water extraction from the water source. For additional detail on this refer to the water sharing plan.

Note 8 – Surface water storage

This is the actual volume of water stored in the individual surface water storages at the date of reporting. The volumes provided represent the total volume of water in the storage, including dead storage which is the volume of water which can't be accessed under normal operating conditions e.g. volume below low level outlet. It is assumed that the dead storage can be accessed if required via alternative access methods e.g. syphons.

Data type

Derived from measured data

Policy

Not applicable

Data accuracy

A – Estimated in the range +/- 10%

Providing agency

NSW Office of Water

Data source

NSW Office of Water – HYDSTRA

Methodology

Storage volumes are calculated by processing a gauged storage elevation through a rating table that converts it to a volume. For plots of the daily storage volumes refer to Figure 9 and Figure 10.

Additional information

Table 21: Storage summary table

Name	Capacity (ML)	Dead storage (ML)	% change 2013/14
Split Rock Dam	397,370	3,160	▼ 67
Keepit Dam	425,510	6,550	▼ 26
Gunidgera Weir	1,900	375	▼ 36
Mollee Weir	3,250	50	▼ 21

Note 9 – River channel storage

The volume of water stored in the river channel on the day of reporting.

Policy

Not applicable

Data type

Derived from measured data

Data accuracy

B – Estimated in the range +/- 25%

Providing agency

NSW Office of Water

Data sources

NSW Office of Water: HYDSTRA, CAIRO

Methodology

For each river section S(n):

$$V = Q \times T$$

The river channel storage will be equal to the sum of all river section volumes.

$$\text{River channel storage} = \sum S(n)\ V$$

Table 22: Summary of river channel storage calculation components

Symbol	Variable	Data Source	Unit
Q	Average flow in the river section. Calculated by averaging the daily flows at the upstream and downstream river gauges.	HYDSTRA	ML/day
V	Volume in each river section.	Calculated	ML
T	Average travel time for a parcel of water to travel through the river section.	CAIRO	days

Assumptions and approximations:

- Travel times are estimated to the nearest day.
- Daily flow change between gauging sites assumed to be linear.

Note 10 – Storage inflow

Storage inflow refers to the volume of water flowing into the major headwater storages – Split Rock Dam and Keepit Dam.

Policy

Not applicable

Data type

Derived from measured data

Data accuracy

A – Estimated in the range +/- 10%

Providing agency

NSW Office of Water

Data sources

NSW Office of Water: HYDSTRA, Integrated Quantity and Quality Model (IQQM)

Methodology

In most of the major storages in NSW there is no direct measurement of inflows. However, it is possible to calculate inflows by using a mass balance approach (based on balancing the change in storage volume) where inflow is the only unknown. This is referred to a backcalculation of inflows.

The backcalculation figures were derived using a one day time step with the inflow calculated according to the equation below. The daily inflows are then summed to provide an annual inflow figure.

$$I = \Delta S + O + Se + ((E - R) * Kp * A)$$

Table 23: Components for backcalculation of inflow

Symbol	Variable	Unit
I	Inflow	ML/day
ΔS	Change in storage volume	ML
O	Outflow	ML/day
Se	Seepage	ML/day
R	Rainfall	mm/day
E	Evaporation	mm/day
Kp	Pan evaporation factor	
A	Surface area - derived from height to surface areas lookup curve	ha

For Keepit Dam, inflow is provided by both the Manilla River and inflow from the upper Namoi (unregulated) river. This split was estimated in the GPWAR by subtracting the inflow from the Namoi River upstream of the Manilla River (419005) and the flow from Halls Creek (419029) from the total backcalculated inflow. For a plot of the daily storage inflows refer to Figure 7 and Figure 8.

Assumptions and approximations:

- Constant storage specific pan evaporation factors are applied (one annual factor).
- Seepage was assumed to be zero

Table 24: Pan factor utilised for storage evaporation calculations

Dam	Pan factor
Split Rock	0.85
Keepit	1.00

Note 11 – Storage evaporation and storage rainfall

This refers to the volume of water effective on Spilt Rock and Keepit Dams that is either lost as a result of evaporation, or gained as a result of rainfall.

Data type

Derived from measured data

Policy

Not applicable

Data accuracy

B – Estimated in the range +/- 25%

Providing agency

NSW Office of Water

Data source

NSW Office of Water – IQQM backcalculation, HYDSTRA

Methodology

While the backcalculation methodology requires the effect of evaporation and rainfall on the storage to be calculated, it is currently output as a net evaporation figure. The AWAS 1 specifies that off-setting should be avoided and as such, a further calculation was required to split the net evaporation figure to rainfall and evaporation. This is achieved by first, outputting daily time-series of storage surface area from the backcalculation (which uses a height to area lookup curve as defined in HYDSTRA). Daily rainfall and evaporation data is applied to the area time-series to achieve a volume in megalitres which is aggregated to an annual figure. The rainfall and evaporation data utilised is equivalent to the data used in the storage inflow backcalculation, with the same pan factor applied to the evaporation data.

Rainfall: Volume (ML) = Rainfall (mm) x Area (m^2) x 10^{-6}

Evaporation: Volume (ML) = Pan Evaporation (mm) x Pan Factor x Area (m^2) x 10^{-6}

Note 12 – River evaporation and river rainfall

This refers to the volume of water effective on the accounted river reach that is either lost as a result of evaporation, or gained as a result of rainfall.

Data type

Derived from measured data

Policy

Not applicable

Data accuracy

C – Estimated in the range +/- 50%

Providing agency

NSW Office of Water

Data source

NSW Office of Water: HYDSTRA, ARCGIS

QLD Department of Natural Resources: SILO

Methodology

The volume applied for evaporation and rainfall on the regulated river is achieved by first calculating a daily time-series of river area. This is achieved by breaking the river up into reaches and utilising the cross sections recorded at river gauging locations to determine the average width of the river with a given daily flow. River length is then determined between two gauging locations using ARCGIS and as such an area for each reach can be defined.

Area (m^2) = Average W (m) x L (m)

Where W is the daily width determined from the gauging cross sections and L is the length as determined through ARCGIS analysis.

With daily area determined, various climate stations are then selected based on their proximity to each river reach. Rainfall and evaporation data is then extracted from SILO and applied to the area time-series to achieve a volume in megalitres which is then aggregated to an annual figure.

Rainfall: Volume (ML) = Rainfall (mm) x Area (m^2) x 10^{-6}

Evaporation: Volume (ML) = ETo (mm) x Kc x Area (m^2) x 10^{-6}

Where ETo = reference evapotranspiration from SILO and Kc = crop factor for open water (1.05)

Note 13 – Gauged tributary inflow

The inflow into the regulated river that occurs downstream of the headwater storages that is measured at known gauging stations.

Policy

Not applicable

Data type

Measured data

Data accuracy

A – Estimated in the range +/- 10%

Providing agency

NSW Office of Water

Data sources

NSW Office of Water: HYDSTRA

Methodology

The flows are obtained by measuring river heights at gauging stations along the river, and then passing these heights through a rating table that converts them to a daily flow volume.

Additional information

The total gauged inflow for 2013-14 is the sum of the inflows for the gauged tributaries defined in the table below.

Table 25: Summary of gauged tributary inflow 2013-14

Station code	Station name	Catchment area (sq km)	Inflow (ML)	Total Inflow (ML)
Upper Namoi				
419005	Namoi River at North Cuerindi	3,160	13,682	14,560[18]
419029	Halls Creek at Ukolan		878	
Lower Namoi				
419006	Peel River at Carrol Gap	4,670	18,385	51,816
419084	Mooki River at Ruvigne	N/A	19,444	
419032	Coxs Creek at Boggabri	4,040	6,078	
419083	Brigalow Creek at Tharlene	N/A	5,078	
419051	Maules Creek at Avoca East	663	2,831	

[18] Previous GPWARs have determined gauged inflow to the upper Namoi as equal to the flow at Namoi River at Manilla Railway Bridge less the flow at Manilla River at Brabri. In this GPWAR there were issues with the Brabri gauging data, and therefore the gauges 419005 and 419029 were used as an alternative.

Figure 23: Upper Namoi gauged tributary inflows 2013-14

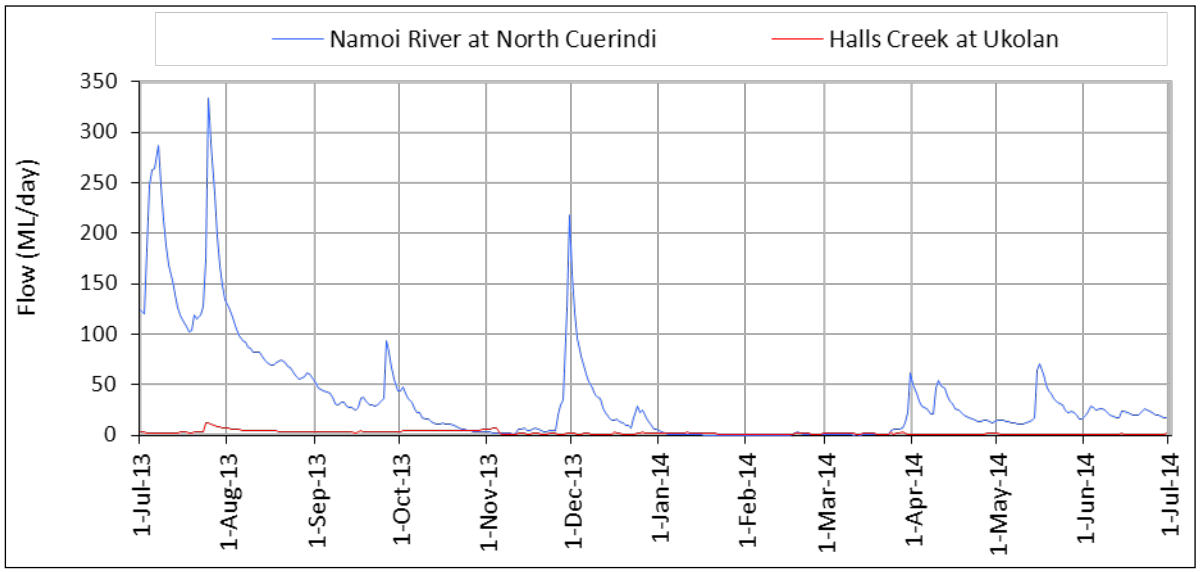
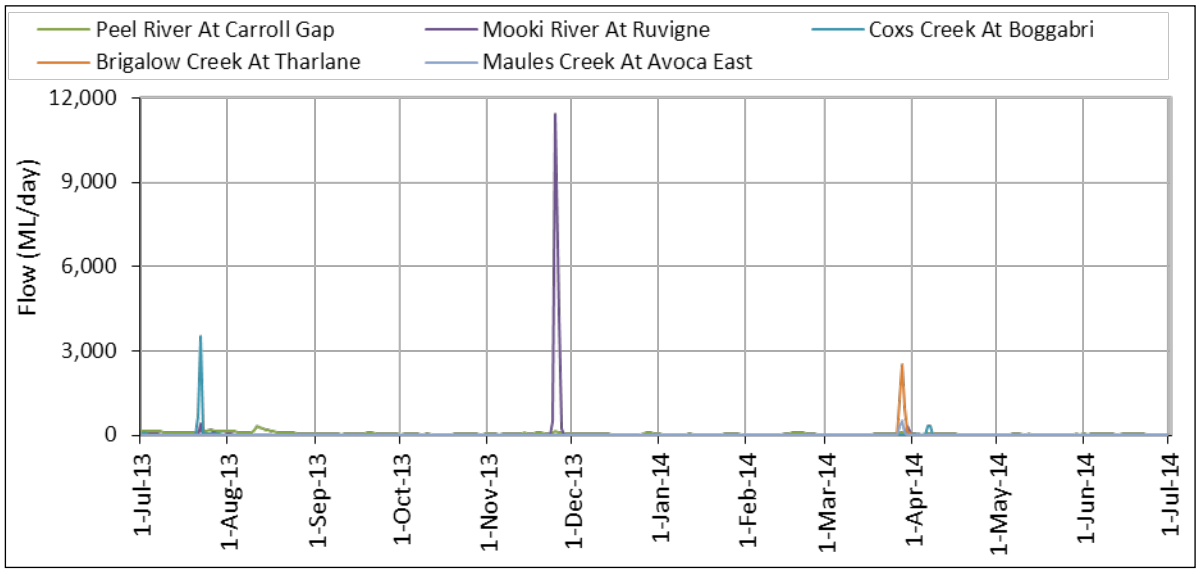


Figure 24: Lower Namoi gauged tributary inflows 2013-14



Note 14 – Ungauged runoff estimate

The inflow into the river that occurs downstream of the headwater storages that is not measured.

Policy

Not applicable

Data type

Estimated

Data accuracy

C – Estimated in the range +/- 50 per cent

Providing agency

NSW Office of Water

Data sources

NSW Office of Water, Statewater: CAIRO

Methodology

To derive an estimate a simple mass balance approach was adopted whereby known inflows and outflows were combined with an assumed loss factor. No estimate was made for the areas below the Goangra gauge in the Namoi River and Waminda gauge in Pian Creek. Upper Namoi estimates were based on inflows between Split Rock Dam and Keepit Dam.

$UI = EoS - SR – GI + E + LE$

Where:

UI = Ungauged Inflow Estimate

EoS = Gauged Flow at the point in the system where no further inflow is estimated downstream for the purposes of this ungauged calculation.

SR_k = Storage release

GI = Gauged inflows

E = Extractions (excluding any that are below the nominated 'EoS')

LE = Estimated losses. This was assumed to be 5% of the measured (gauged flow plus storage releases) entering the system for the Upper Namoi, 5% from Keepit Dam to Mollee Weir and 30% downstream of Mollee Weir.

Table 26: Summary of 2013-14 ungauged Inflow Estimate

Catchment	Total volume estimated (ML)
Upper Namoi	6,000
Lower Namoi	40,000

Note 15 – Dam releases, river inflow from dam releases

The volume of water released from Split Rock and Keepit storages. In the accounting process this release is represented as both a decrease in asset (of the dam) and an equal increase in asset (of the river).

Policy

Not applicable

Data type

Measured data

Data accuracy

A – Estimated in the range +/- 10%

Providing agency

NSW Office of Water

Data sources

NSW Office of Water: HYDSTRA

Methodology

The flows are obtained by measuring river heights at a gauging station downstream of the dam wall, and then passing these heights through a rating table that converts them to a daily flow volume. The releases have been represented in the Statement of Changes in Water Assets and Water Liabilities as both a decrease in water asset (water leaving the dam) and an equal volume of increase in water asset (water released increasing the volume of the river). It would have been also possible to account this as a transfer in asset whereby the volumes would not appear in the statements.

Additional information

Figure 25: Split Rock Dam storages releases 2013-14

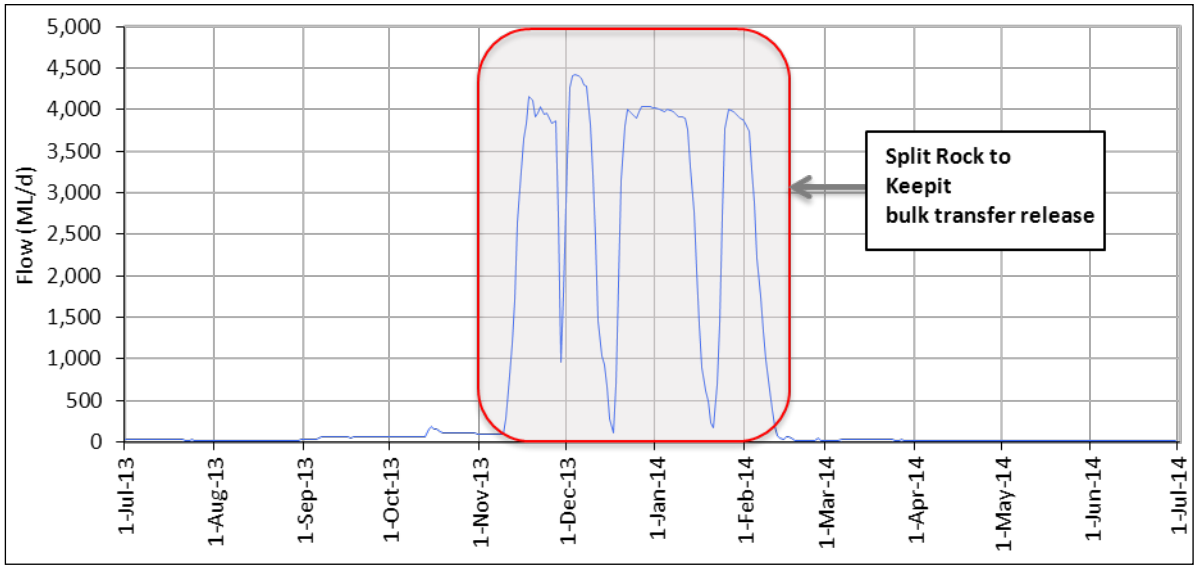
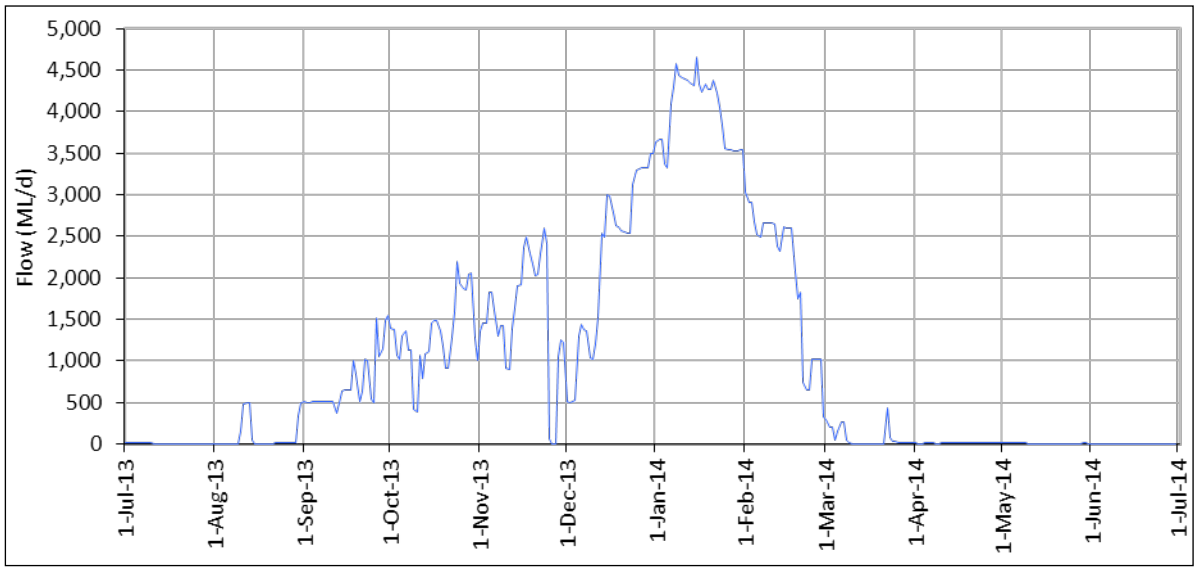


Figure 26: Keepit Dam storage releases 2013-14



Note 16 – End of system flows

This refers to flow that leaves the entity and does not return to the entity.

It is important to note that an end of system environmental flow provision for the Namoi is specified in the Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2003. Details on this provision are specified in Note 7 of this GPWAR.

Data type

Derived from measured data

Policy

Not applicable

Data accuracy

A – Estimated in the range +/- 10%

Providing agency

NSW Office of Water

Data source

NSW Office of Water – HYDSTRA

Methodology

This is the summation of flows at gauging site/s measuring the volume of water that leaves the entity at end of system locations.

While it appears that the most logical site to record the end of system flow for the Namoi is at Walgett (419091) it is not appropriate as it is backwater affected in times of flooding in the Barwon River.

Therefore for the Namoi reporting entity the end of system has been considered to be the summation of the flow passing the Namoi River at Goangra (419026) and Pian Creek at Waminda (419079).

Gauges at these locations record a time series of heights which are then converted to a volume of water based on a derived 'height to flow' relationship (rating table).

Additional information

Table 27: End of system gauging site flows

Station name	Station code	2013-14 outflow (ML)
Namoi River at Goangra	419026	48,600
Pian Creek at Waminda	419079	2,252

Figure 27: Pian Creek at Waminda flow 2013-14

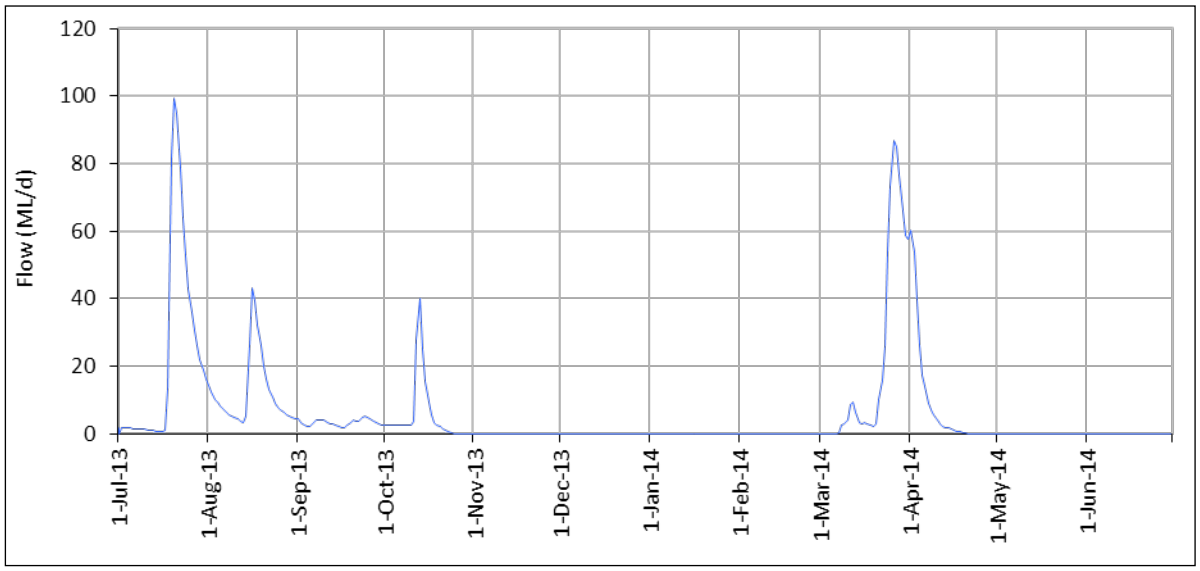
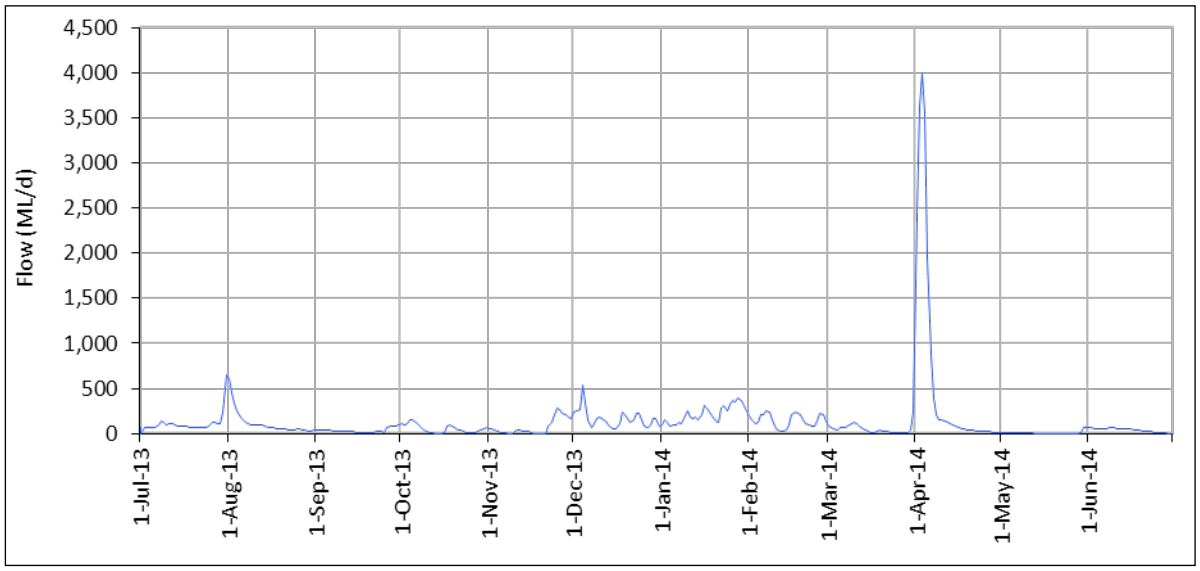


Figure 28: Namoi River at Goangra flow 2013-14



Note 17 – Extractions from river

This is the actual volume of water directly pumped or diverted from the regulated river by licence holders. Occasionally (generally in the case of environmental water) volumes are ordered against a licence account for in-stream benefits or to pass through end of system target points. As such the volume reported to be physically extracted from the accounted river extent will not always be equal to the amount of water debited against accounts for usage, which has been described in Note 3. The volume stated for extractions from river excludes basic rights extractions, which is reported as a separate line item and detailed in Note 18.

Data type

Measured data

Policy

Not applicable

Data accuracy

A – Estimated in the range +/- 10%

Providing agency

NSW Office of Water

Data source

State Water/NSW Office of Water – Water Accounting System (joint ownership of system).

Methodology

For the purposes of this GPWAR extraction from the river is considered to be the total volume metered and debited to the allocation accounts minus any licenced account water that can be identified as being used within the system, or ordered to be passed through the system. These volumes are generally associated with environmental water orders and have already been accounted for in other line items. In 2013-14 no licenced account water was identified as being used within the system or ordered to be passed through the system i.e. all account usage was extracted was from the river.

Additional information

Table 28: Reconciliation of physical extraction to account usage (ML)

	Lower Namoi	Upper Namoi
Licenced extractions from River [19]	266,856	4,685
plus		
Licenced flow leaving System [20]	0	0
plus		
In stream licenced usage [21]	0	0
equals		
Total account usage [22]	266,856	4,685

[19] Direct licenced extractions from the river excluding basic rights usage estimate

[20] Licenced water ordered to leave the accounted Namoi extent for environmental benefits

[21] Water ordered and used within the accounted system for environmental benefit (not extracted from the river)

[22] The total amount of water accounted for usage against the allocation accounts

Note 18 – Basic rights extractions

This is the non-licensed right to extract water to meet basic requirements for household purposes (non-commercial uses in and around the house and garden) and for watering of stock. It is available for anyone who has access to river frontage on their property.

This water cannot be used for irrigating crops or garden produce that will be sold or bartered, for washing down machinery sheds or for intensive livestock operations.

In times of limited supply, there may be restrictions on taking water for domestic and stock use.

Data Type

Estimated

Policy

Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated Rivers Water Sources 2003

- Part 4 Basic Landholder Rights
    - Clause 18 Domestic and stock rights

Available on the NSW Office of Water website at: www.water.nsw.gov.au.

Data accuracy

C – Estimated in the range +/- 50%

Providing agency

NSW Office of Water

Data source

Water Sharing Plan for the Upper and Lower Namoi Regulated River Water Source 2003

Methodology

The estimation of domestic and stock rights uses a series of estimates for water usage, stocking rates, population and property shape based on local knowledge to calculate riparian (stock and domestic) requirements in megalitres per year. The annual extraction for domestic and stock rights in the water accounts is assumed to be the estimated figure stated in the Water Sharing Plan for the Upper and Lower Namoi Regulated Rivers Water Source 2003 being 160 megalitres per year for the Upper Namoi and 1,776 megalitres per year for the Lower Namoi.

Note 19 – Replenishments flows

This refers to water that must be set aside in Split Rock and/or Keepit Dam as part of the essential requirements for the provision of flows to Pian Creek. The water is to supply water for households, town use and stock and for accounting purposes is wholly within the system so does not appear as separate entry in water accounting statements.

The requirement is that up to two replenishment flows, producing a visible flow for 5 or more consecutive days at Waminda gauge, are to be provided annually with total flows that must not exceed 14,000 megalitres in a single water year at Pian Creek downstream of Dundee. The two replenishments are generally delivered from unregulated flows in the system but can be supplemented from Keepit Dam releases if necessary.

Data type

Calculated from measured data

Policy

Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Source 2003.

- Part 12 System operation rules
  - Clause 60 Replenishment flows

Available on the NSW Office of Water website at www.water.nsw.gov.au

Data accuracy

A – Estimated in the range +/- 10 per cent

Providing agency

NSW Office of Water

Data source

NSW Office of Water – State Water Compliance Report (Internal document)

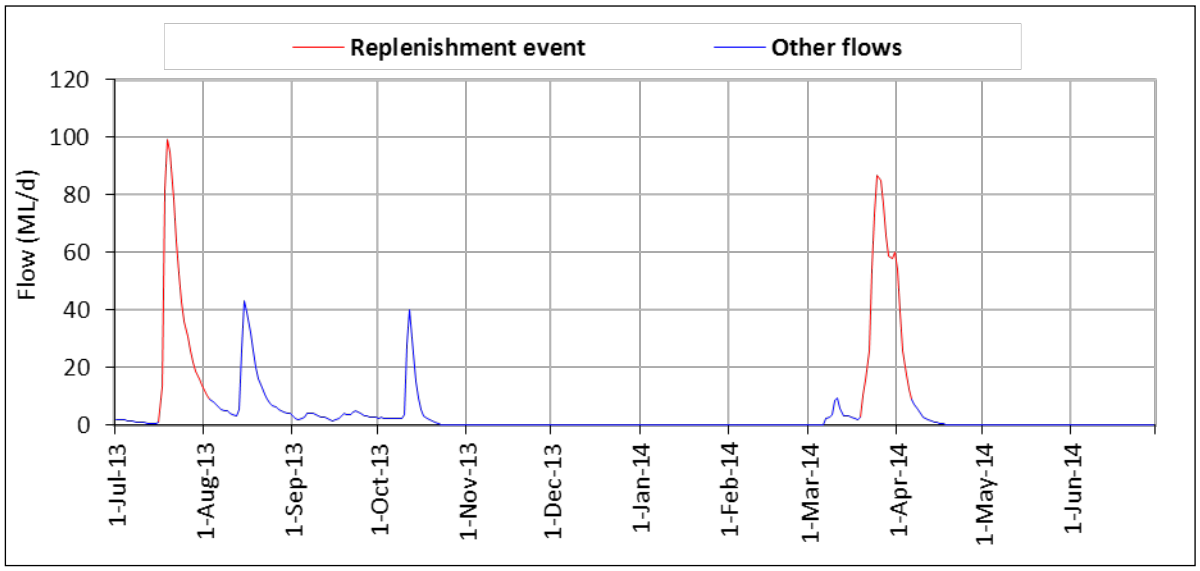
Methodology

Up to two replenishment flow events are to be provided annually from a combination of unregulated flows and Keepit Dam releases and diverted down Gunidgera/Pian Creek system with Pian Creek at Waminda gauging station used for compliance.

Additional Information

The requirements for replenishment flows were delivered during 2013-14. Below is a plot identifying those periods of Replenishment flow provision at Waminda gauge.

Figure 29: Replenishment flows to Pian Creek (Pian Creek at Waminda)



Note 20 – Supplementary extractions

This is the volume of water extracted or diverted under supplementary access licences during announced periods of supplementary water. Supplementary flow events are announced periodically during the season when high flow events occur with the period of extraction and volume of water to be extracted determined based on the rules as set out in the water sharing plans. It is important to note that supplementary access licences differ from other categories of access licence in that the volume of water in the account refers to an annual upper limit for extractions and its provision is totally reliant on the occurrence of high flow events.

Data type

Measured data

Policy

Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated Rivers Water Sources 2003

Part 8 Limits to the availability of water

Division 2 - Available water determinations

- Clause 39 Available water determinations for supplementary water access licences

Part 9 Rules for managing access licences

Division 3 - Extraction conditions

- Clause 49 Taking of water under supplementary water access licences in the Lower Namoi Water Source

Available on the NSW Office of Water website at: www.water.nsw.gov.au.

Data accuracy

A - Estimated in the range +/- 10%

Providing agency

NSW Office of Water

Data source

State Water/NSW Office of Water – Water Accounting System (Joint ownership of system).

Methodology

Supplementary water extraction and diversion data is collected by either on farm meters that measure extraction or gauges on diversion works. Meter readings are collected for individual licence holders at intervals during the year and converted via a calibration factor to a volume of water extracted. Water diverted from the river is measured by recording the height at either the gauge or weir with the volume diverted being derived by passing these heights through a rating table. However, with supplementary water being extracted through the same pumps as those extracting water under other categories of access licences additional information is required to separate out supplementary extraction. Basically licence holders provide notification of their intention to pump prior to pumping or diverting water during the declared supplementary event and provide meter readings both at the commencement and conclusion of pumping. This enables the supplementary flow extraction to be assessed independent of other categories of access licences.

Additional information

Figure 30: Lower Namoi Supplementary Usage by River Section 2013-14

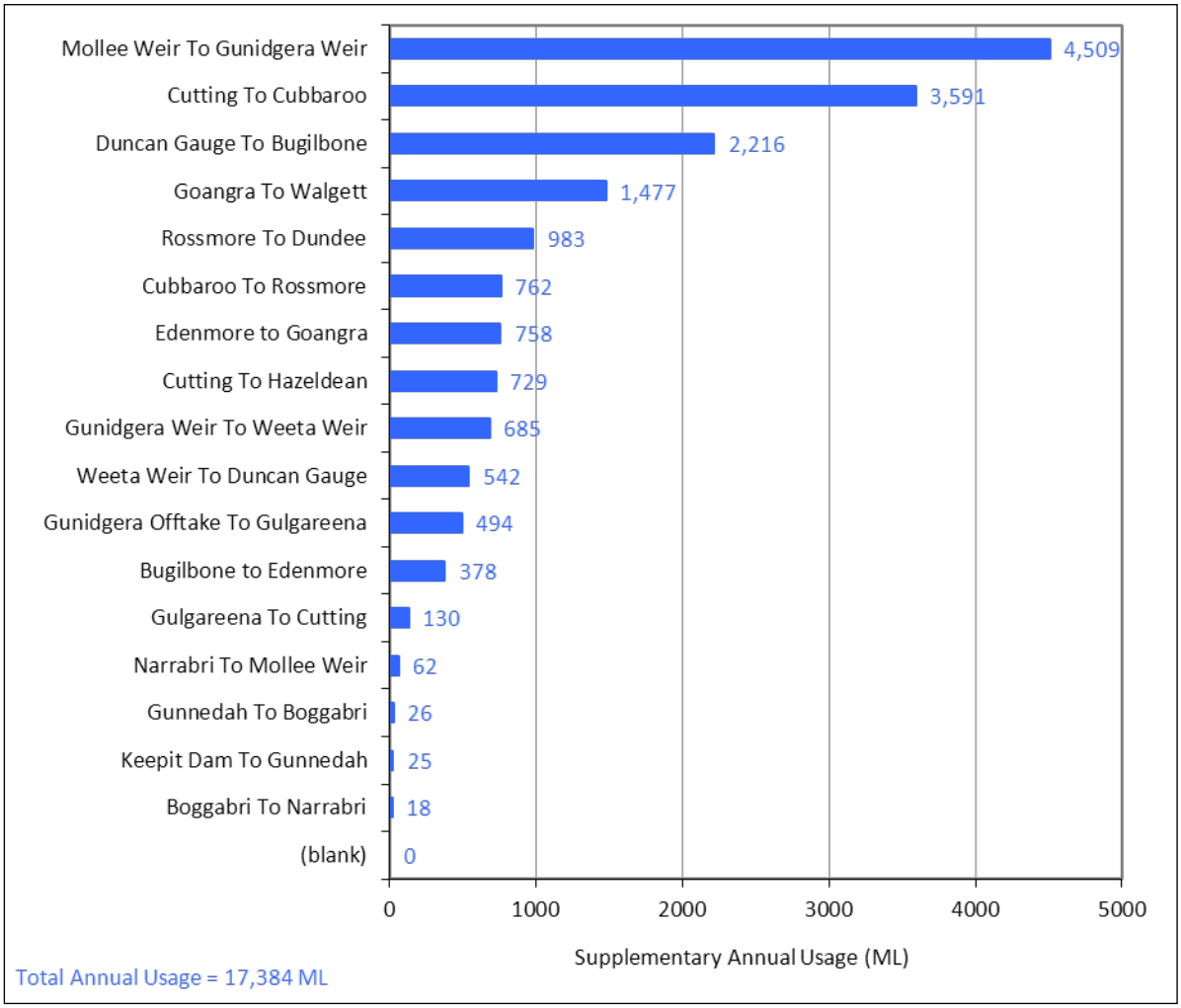


Table 29: Lower Namoi supplementary events 2013-14

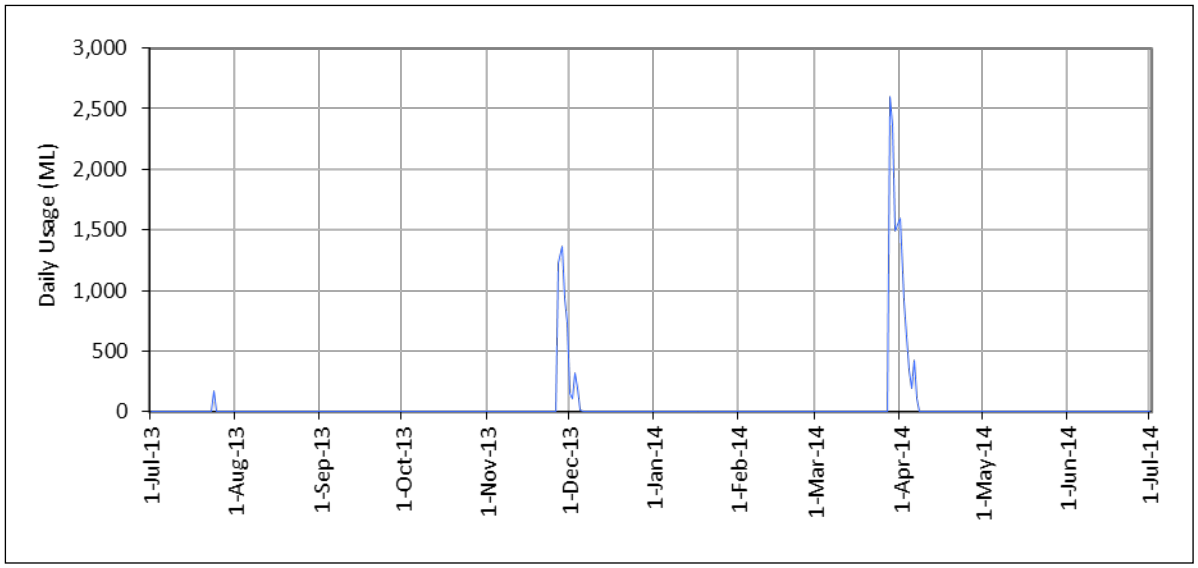
Event Period:	**24 July 2013 to 24 July 2013**		
Event Limit:	2.00% or 0.0200 ML per Share		
Announcement Date:	23 July 2013		
Catchment	**Section**	**Start Date**	**End Date**
NAMOI RIVER	Mollee Weir To Gunidgera Weir	24 July 2013	24 July 2013

Event Period:	26 November 2013 to 07 December 2013		
Event Limit:	6.00% or 0.0600 ML per Share		
Announcement Date:	26 November 2013		
Catchment	**Section**	**Start Date**	**End Date**
NAMOI RIVER	Keepit Dam To Gunnedah	26 November 2013	28 November 2013
UNNAMED WATERCOURSE	Unnamed Water Course	28 November 2013	29 November 2013
NAMOI RIVER	Gunnedah To Boggabri	26 November 2013	28 November 2013
NAMOI RIVER	Boggabri To Narrabri	27 November 2013	29 November 2013
NARRABRI CREEK	Narrabri To Mollee Weir	27 November 2013	30 November 2013
NAMOI RIVER	Mollee Weir To Gunidgera Weir	27 November 2013	28 November 2013
NAMOI RIVER	Gunidgera Weir To Weeta Weir	27 November 2013	28 November 2013
NAMOI RIVER	Weeta Weir To Duncan Gauge	28 November 2013	29 November 2013
NAMOI RIVER	Duncan Gauge To Bugilbone	29 November 2013	30 November 2013
DUNCAN WARRAMBOOL	Duncan Warrambool	28 November 2013	30 November 2013
NAMOI RIVER	Bugilbone To Edenmore	30 November 2013	03 December 2013
NAMOI RIVER	Edenmore To Goangra	30 November 2013	04 December 2013
NAMOI RIVER	Goangra To Walgett	03 December 2013	06 December 2013
GUNIDGERA CREEK	Gulgareena To Cutting	28 November 2013	01 December 2013
PIAN CREEK	Cutting To Knights	28 November 2013	01 December 2013
GUNIDGERA CREEK	Cutting To Hazeldean	28 November 2013	01 December 2013
PIAN CREEK	Knights To Cubbaroo	28 November 2013	01 December 2013

Event Period:	28 March 2014 to 08 April 2014		
Event Limit:	14.00% or 0.1400 ML per Share		
Announcement Date:	28 March 2014		
Catchment	**Section**	**Start Date**	**End Date**
UNNAMED WATERCOURSE	Unnamed Water Course	28 March 2014	01 April 2014
ANA BR.NAMOI RIVER	Ana Br.Namoi River	28 March 2014	30 March 2014
NARRABRI CREEK	Narrabri To Mollee Weir	28 March 2014	29 March 2014
NAMOI RIVER	Mollee Weir To Gunidgera Weir	28 March 2014	29 March 2014
NAMOI RIVER	Gunidgera Weir To Weeta Weir	28 March 2014	29 March 2014
NAMOI RIVER	Weeta Weir To Duncan Gauge	28 March 2014	29 March 2014
NAMOI RIVER	Duncan Gauge To Bugilbone	28 March 2014	30 March 2014
DUNCAN WARRAMBOOL	Duncan Warrambool	28 March 2014	31 March 2014
GUNIDGERA CREEK	Gunidgera Weir To Gulgareena	28 March 2014	29 March 2014
GUNIDGERA CREEK	Gulgareena To Cutting	29 March 2014	30 March 2014
PIAN CREEK	Cutting To Knights	29 March 2014	01 April 2014
GUNIDGERA CREEK	Cutting To Hazeldean	30 March 2014	03 April 2014
PIAN CREEK	Knights To Cubbaroo	30 March 2014	02 April 2014
PIAN CREEK	Cubbaroo To Rossmore	31 March 2014	04 April 2014
PIAN CREEK	Rossmore To Dundee	31 March 2014	07 April 2014

Event Period:	28 March 2014 to 08 April 2014		
Event Limit:	20.00% or 0.2000 ML per Share		
Announcement Date:	28 February 2014		
Catchment	**Section**	**Start Date**	**End Date**
NAMOI RIVER	Bugilbone To Edenmore	30 March 2014	02 April 2014
NAMOI RIVER	Edenmore To Goangra	31 March 2014	05 April 2014
NAMOI RIVER	Goangra To Walgett	01 April 2014	06 April 2014

Figure 31: Lower Namoi daily supplementary usage plot 2013-14



Note: No supplementary licences exist for the Upper Namoi water source.

Note 21 – River and groundwater interaction

This note refers to water that has been identified as either flowing from the connected alluvium to the accounted river extent (increase in water asset), or alternatively from the accounted river extent to the alluvium aquifer (decrease in water asset).

Note while a detailed water budget for the groundwater aquifer itself had previously been reported within the water accounting statements (Namoi catchment General Purpose Water Accounting Report 2010-11), this information is now being presented in the groundwater appendix of this document.

Data type

Modelled

Policy

Not applicable

Data accuracy

D – Estimated in the range +/- 100%

Providing agency

NSW Office of Water

Data source

NSW Office of Water MODFLOW (Data inputs from HYDSTRA, GDS)

Methodology

For the Upper and Lower Namoi groundwater sources the annual budget has been estimated using the NSW Office of Water MODFLOW for the upper and lower Namoi Groundwater Management Area (for a more detailed explanation of the Method, see 'Method A' in the document NSW General Purpose Water Accounting Reports - Groundwater Methodologies, available for download from the NSW Office of Water website).

No estimates were made for interactions with the river outside the area covered by the upper and lower Namoi groundwater sources.

Note 22 – Unaccounted difference

In theory if all the processes of a water balance could be accurately accounted for the unaccounted difference would be zero. In reality due to the large uncertainties in many of the volumes presented in the accounts, the various sources from which the data has been obtained and the fact that not all processes of the water cycle have been accounted, the statements are not balanced at the end of the accounting process. In order to balance the accounts a final balancing entry is required, and this is termed the unaccounted difference. As technology progresses and accuracy improves in the account estimates, it is anticipated that relatively, this figure should reduce in future accounts.

Data type

Not applicable

Policy

Not applicable

Data accuracy

D – Estimated in the range +/- 100%

Providing agency

Not applicable

Data source

Not applicable

Methodology

The unaccounted difference is equal to the amount required to obtain the correct volume in river at the end of the reporting period, after all the known physical inflows and outflows have been accounted. The double-entry accounting process attempted to represent the physical movement of water by creating a river asset. The opening and closing balance of the river volume was estimated according to Note 9.

Surface Water Unaccounted difference

$$UVSW = Rs - Rc + RI - Ro$$

Where:

UVSW = Unaccounted difference for Surface Water

Rs = Opening river volume estimate

Rc = Closing river volume estimate

Ro = Physical outflows from the river (e.g. extractions)

RI = Physical inflows to the river (e.g. runoff, return flows, dam releases)

Note 23 – Adjusting entry

This is a line item that is used to correct balances in the accounts. The double entry accounting being applied is a continuous process whereby the closing balance of one year is the opening balance for the following year.

Occasionally corrections will be required for a variety of reasons including when an error is identified in prior year reporting, a balance in the previous year has been since adjusted or when a process that had previously been reported is unable to be supplied and the associated asset or liability must be removed to maintain the integrity of the statements.

This is different to the unaccounted difference component which is a physical volume required to achieve mass balance after all the known processes have been accounted.

Data type

Calculated

Accuracy

A1 – Nil inaccuracy +/- 0 per cent

Providing agency

NSW Office of Water.

Data source

Not applicable

Methodology

A journal entry is placed in the comparative year to ensure correct opening balances are achieved in the reporting year.

Appendix 1 - Groundwater

Groundwater management

Groundwater management for the area bounded by the Namoi surface water catchment is covered by six water sharing plans and all or part of 25 of the groundwater sources listed within these plans (detailed in Table 30 below). Allowing for domestic and stock rights and native title rights, the water sharing plans set sustainable extraction limits for each water source. These extraction limits determine the maximum volume of water that may be extracted under access licences on a long-term average annual basis.

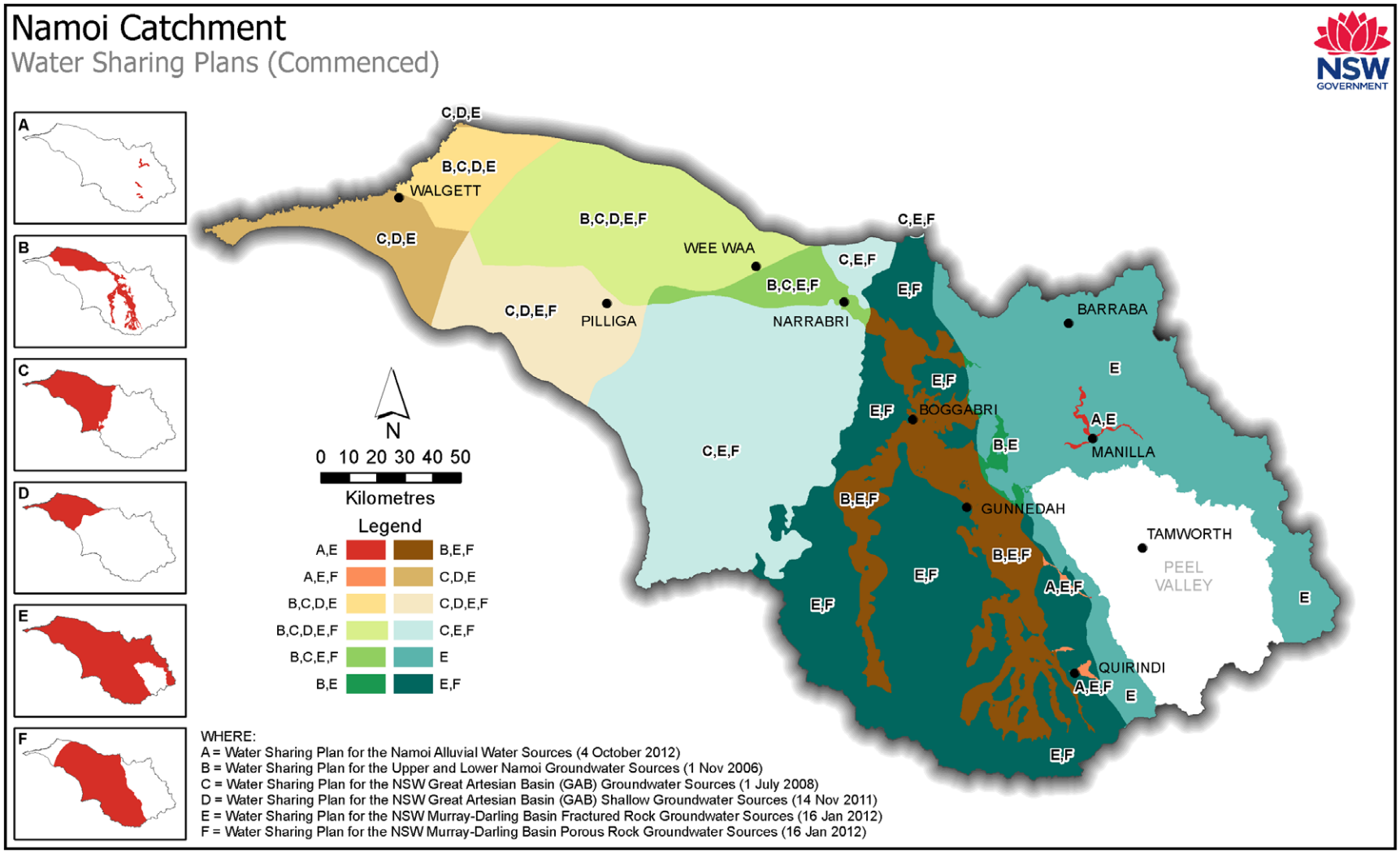
Groundwater sources often cross multiple surface water catchment areas and hence only part of the area residing in the Namoi catchment. The percentage of each groundwater source covering the Namoi catchment can be found in Table 32.

A spatial representation of the areas covered by each of the water sharing plans can be seen in Figure 32. This shows that a number of groundwater water sharing plans overlay the same surface area due to the varying depths of the aquifers within the catchment.

Table 30: Namoi groundwater water sharing plan summary

Water sharing plan	Water sources applicable for the Namoi Catchment	Date commenced	Expires
Water Sharing Plan for the Namoi Unregulated and Alluvial Water Sources 2012	Manilla Alluvial Groundwater Source	4 October 2012	30 June 2023
	Currabubula Alluvial Groundwater Source		
	Quipolly Alluvium Groundwater Source		
	Quirindi Alluvium Groundwater Source		
Water Sharing Plan for the Upper and Lower Namoi Groundwater Sources 2003	Upper Namoi Zone 1, Borambil Creek Groundwater Source	1 November 2006	30 June 2017
	Upper Namoi Zone 2, Cox's Creek (Mullaley to Boggabri) Groundwater Source		
	Upper Namoi Zone 3, Mooki Valley (Breeza to Gunnedah) Groundwater Source		
	Upper Namoi Zone 4, Namoi Valley (Keepit Dam to Gin's Leap) Groundwater Source		
	Upper Namoi Zone 5, Namoi Valley (Gin's Leap to Narrabri) Groundwater Source		
	Upper Namoi Zone 6, Tributaries of the Liverpool Range (South to Pine Ridge Road) Groundwater Source		
	Upper Namoi Zone 7, Yarraman Creek, (East of Lake Goran to Mooki River) Groundwater Source		
	Upper Namoi Zone 8, Mooki Valley (Quirindi—Pine Ridge Road to Breeza) Groundwater Source		
	Upper Namoi Zone 9, Cox's Creek (up-stream Mullaley) Groundwater Source		
	Upper Namoi Zone 10, Warrah Creek Groundwater Source		
	Upper Namoi Zone 11, Maules Creek Groundwater Source		
	Upper Namoi Zone 12, Kelvin Valley Groundwater Source		
	Lower Namoi Groundwater Source		
Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources	Southern Recharge Groundwater Source	1 July 2008	30 June 2018
	Surat Groundwater Source		
Water Sharing Plan for the NSW Great Artesian Basin Shallow Groundwater Sources	Surat Shallow Groundwater Source	14 November 2011	30 June 2020
Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources	Lachlan Fold Belt MDB Groundwater Source	16 January 2012	30 June 2022
	Liverpool Ranges Basalt MDB Groundwater Source		
	New England Fold Belt MDB Groundwater Source		
	Warrumbungle Basalt Groundwater Source		
Water Sharing Plan for the NSW Murray-Darling Basin Porous Rock Groundwater Sources	Gunnedah-Oxley Basin MDB Groundwater Source	16 January 2012	30 June 2022

Figure 32: Namoi surface water catchment – groundwater water sharing plans[23]



[23] Information on the Peel catchment is available in the Peel Catchment GPWAR 2013-14

Groundwater availability

In 2013-14, all groundwater licences in the Namoi were granted an equivalent allocation of 1 megalitre per share, with the exception of Aquifer licences in the Upper Namoi Zone 2, which received an available water determination (AWD) of 2.3 megalitres per share and supplementary water access licences (which are located in the Upper and Lower Namoi Groundwater Sources).

Table 31 provides the AWD for Supplementary licences in 2013-14. Under the terms set out in the Water Sharing Plan for the Upper and Lower Namoi Groundwater Sources, the available water determination for supplementary licences is progressively reduced each year. The AWD will be zero for these licences at the commencement of the 2015/16 water year. The purpose of this licence category was to reduce entitlements to a sustainable level over time allowing affected users to adapt to these changes.

Table 31: Available Water Determinations for Supplementary licences in the Namoi, 2013-14

Water Source	Available Water Determination
Lower Namoi Groundwater Source	0.20
Upper Namoi Zone 1 Borambil Creek Groundwater Source	0.20
Upper Namoi Zone 2 Cox's Creek (Mullaley To Boggabri) Groundwater Source	0.20
Upper Namoi Zone 3 Mooki Valley (Breeza To Gunnedah) Groundwater Source	0.20
Upper Namoi Zone 4 Namoi Valley (Keepit Dam To Gin's Leap) Groundwater Source	0.20
Upper Namoi Zone 5 Namoi Valley (Gin's Leap To Narrabri) Groundwater Source	0.36
Upper Namoi Zone 7 Yarraman Creek (East Of Lake Goran To Mooki River) Groundwater Source	0.67
Upper Namoi Zone 8 Mooki Valley (Quirindi - Pine Ridge Road To Breeza) Groundwater Source	0.20
Upper Namoi Zone 11 Maules Creek Groundwater Source	0.36
Upper Namoi Zone 12 Kelvin Valley Groundwater Source	0.36

Table 32: Namoi surface water catchment groundwater sources summary table (1 of 2)

Groundwater Source	Long Term Annual Extraction Limit (ML/Year)[24]	Licence Category	Share	% of Share Component Announced 2013-14	% within the Namoi Surface Water Catchment	Total Groundwater Source Usage 2013-14 (ML)[25]
Water Sharing Plan for the Namoi Unregulated and Alluvial Water Sources 2012						
Manilla Alluvial Groundwater Source	1,229.2	Domestic and Stock Rights[26]	24.7	N/A	100	232
		Aquifer	1,214	100		
		Aquifer (General Security)	2,311	100		
Currabubula Alluvial Groundwater Source	60.1	Domestic and Stock Rights	17.8	N/A		0
		Local Water Utility	25	100		
		Aquifer	377	100		
Quipolly Alluvium Groundwater Source	475.6	Domestic and Stock Rights	3.9	N/A		125.4
		Aquifer	737	100		
Quirindi Alluvium Groundwater Source	1,231.4	Domestic and Stock Rights	14.1	N/A		219.5
		Local Water Utility	200	100		
		Aquifer	2,690	100		
Water Sharing Plan for the Upper and Lower Namoi Groundwater Sources 2003		**Refer to detailed information in Table 35**			100	211,790
Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources 2008						
Southern Recharge Groundwater Source	See water sharing plan[27]	Domestic and Stock Rights	3,000	N/A	35	2,870
		Local Water Utility	3,318	100		
		Aquifer [Town Water Supply]	25	100		
		Aquifer	5502	100		
Surat Groundwater Source	13,300	Domestic and Stock Rights	28,100	N/A	12	2,503
		Local Water Utility	3318	100		
		Aquifer [Town Water Supply]	25	100		
		Aquifer	5,502	100		

[24] Extraction limits stated may exclude water for basic rights, and water allocated to supplementary licences. Check with the relevant water sharing plan for details.

[25] Usage is for the total groundwater source that is it has not been adjusted to only include that within the Namoi surface water catchment reporting area.

[26] Domestic and Stock Rights are not a licenced entitlement and therefore do not have an allocation announcement associated with them. The value in the table for share is that volume estimated in the water sharing plans for each of the water sources

[27] Extraction limit details available in the water sharing plan and includes adjustments for a range of water saving programs

Table 33: Namoi surface water catchment groundwater sources summary table (2 of 2)

Groundwater Source	Long Term Annual Extraction Limit (ML/Year)[28]	Licence Category	Share	% of Share Component Announced 2013-14	% within the Namoi Surface Water Catchment	Total Groundwater Source Usage (ML/year)[29]
Water Sharing Plan for the NSW Great Artesian Basin Shallow Groundwater Sources 2011						
Surat Shallow Groundwater Source	143,335	Domestic and Stock Rights[30]	978	N/A	12	1,180
		Local Water Utility	50	100		
		Aquifer	5,662	100		
Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2011						
Lachlan Fold Belt MDB Groundwater Source	821,250	Domestic and Stock Rights	74,311	N/A	3	5,940
		Local Water Utility	2,207	100		
		Aquifer	68,148	100		
		Aquifer [Town Water Supply]	547	100		
		Salinity and Water Table Management	236	100		
Liverpool Ranges Basalt MDB Groundwater Source	19,035	Domestic and Stock Rights	1,828	N/A	52	18
		Aquifer	422	100		
New England Fold Belt MDB Groundwater Source	204,784	Domestic and Stock Rights	14,520	N/A	22	83
		Aquifer	7,962	100		
		Local Water Utility	559	100		
Warrumbungle Basalt Groundwater Source	5,710	Domestic and Stock Rights	540	N/A	7	0
		Aquifer	71	100		
Water Sharing Plan for the NSW Murray-Darling Basin Porous Rock Groundwater Sources 2011						
Gunnedah-Oxley Basin MDB Groundwater Source	205,640	Domestic and Stock Rights	5,778	N/A	44	6,123
		Aquifer	22,209	100		
		Local Water Utility	420	100		

[28] Extraction limits stated may exclude water for basic rights, and water allocated to supplementary licences. Check with the relevant water sharing plan for details.

[29] Usage is for the total groundwater source that is it has not been adjusted to only include that within the Namoi surface water catchment reporting area.

[30] Domestic and Stock Rights are not a licenced entitlement and therefore do not have an allocation announcement associated with them. The value in the table for share is that volume estimated in the water sharing plans for each of the water sources

Figure 33: Upper Namoi combined groundwater sources water availability summary[31]

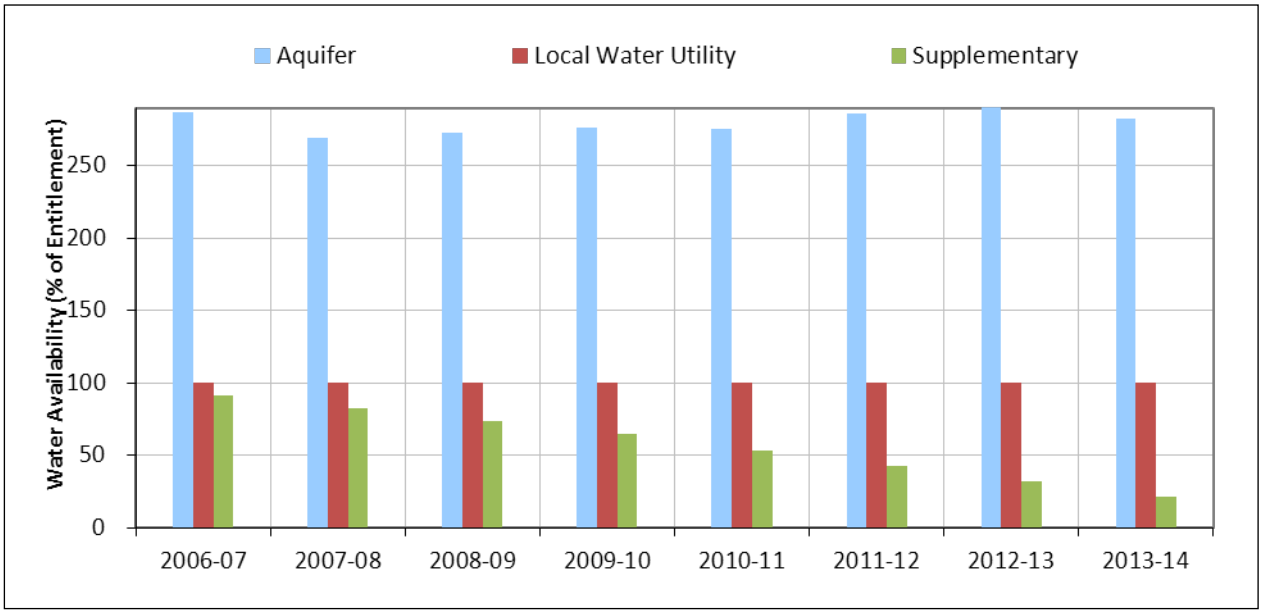
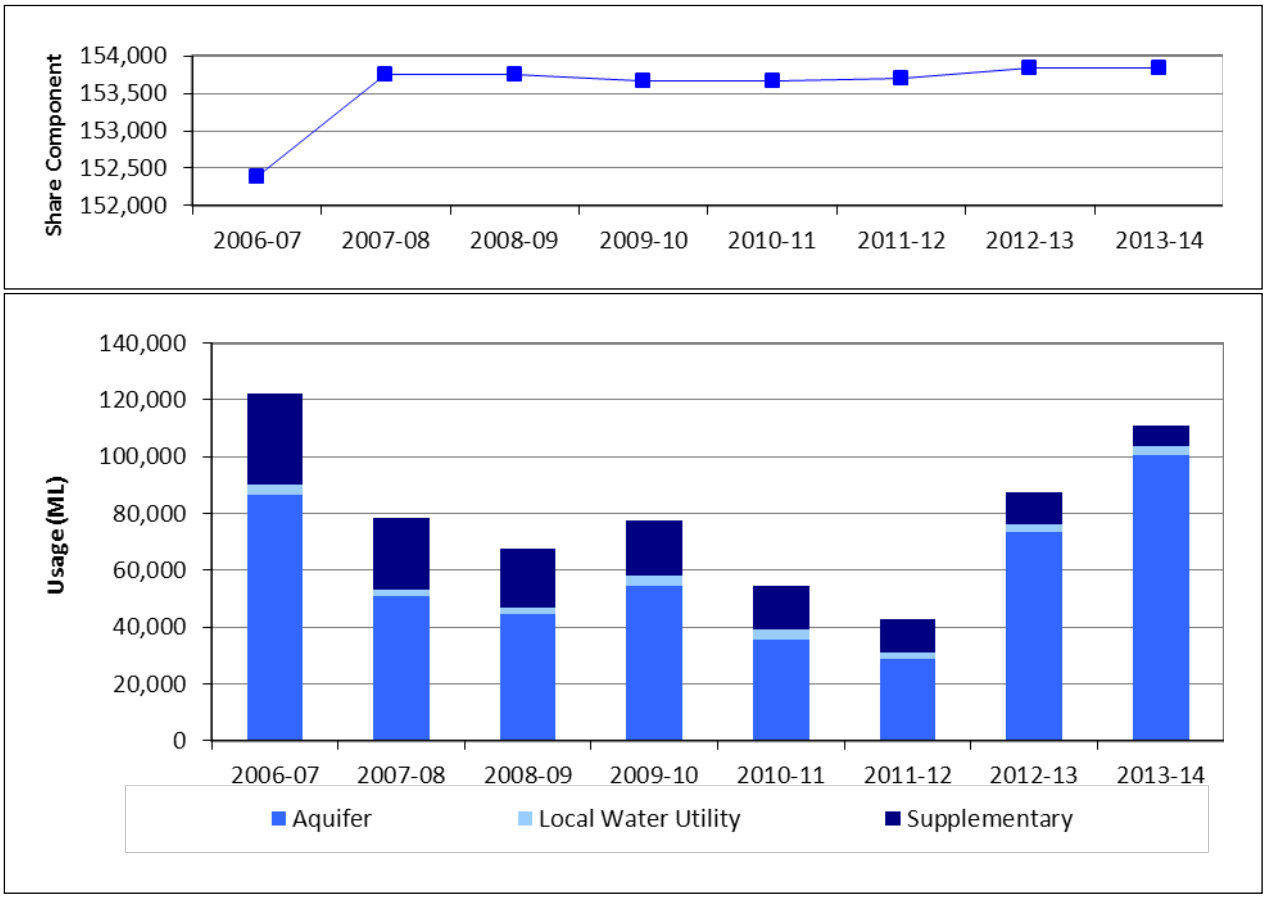


Figure 34: Share component and account usage in the Upper Namoi groundwater sources since the introduction of the water sharing plan.



[31] The 12 water sources that make up the Upper Namoi groundwater management area have been combined.

Figure 35: Allocation assignments within Aquifer licences in the Upper Namoi Groundwater Management Area

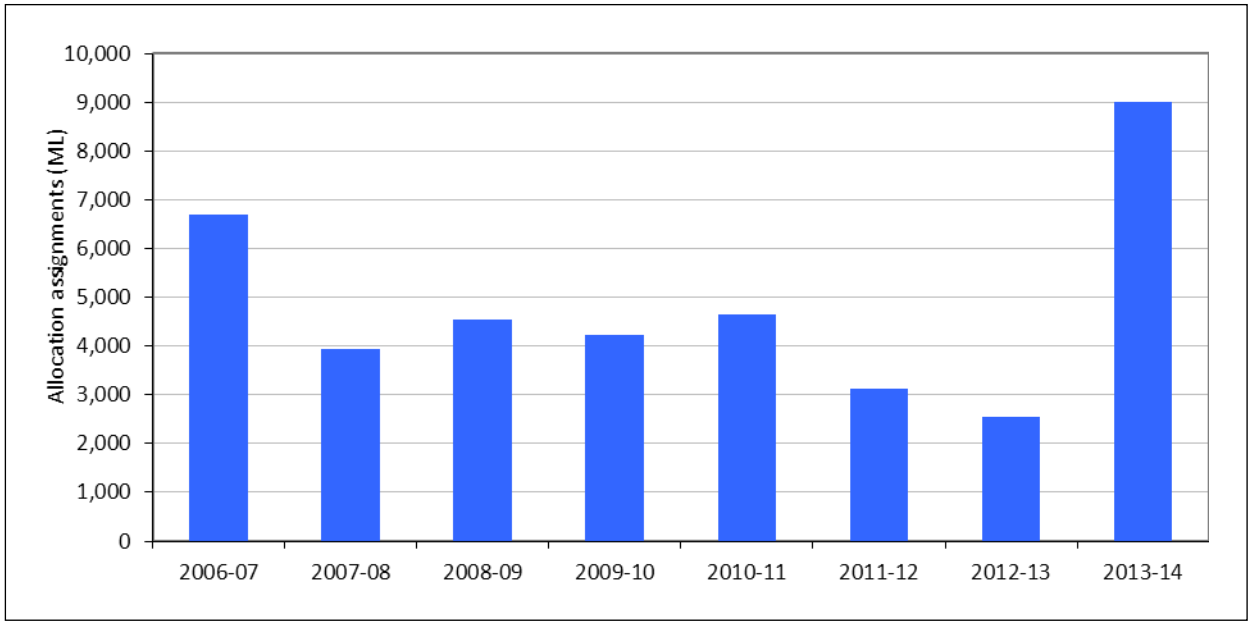


Figure 36: Lower Namoi groundwater source water availability summary

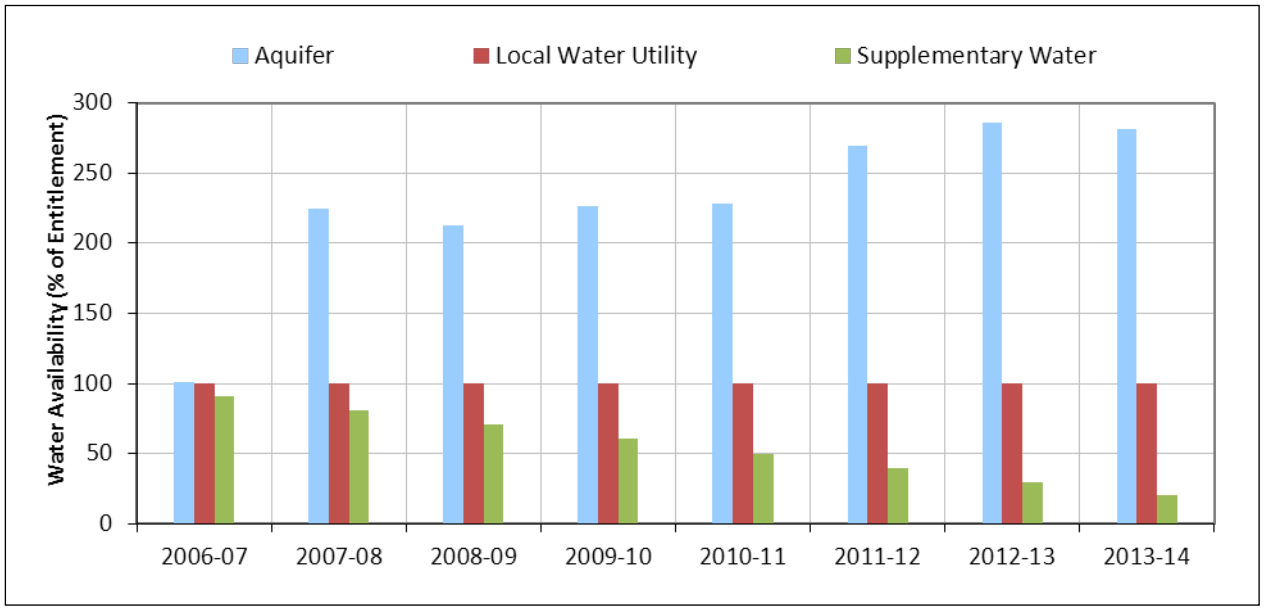


Figure 37: Share component and account usage in the Lower Namoi groundwater source since the introduction of the water sharing plan.

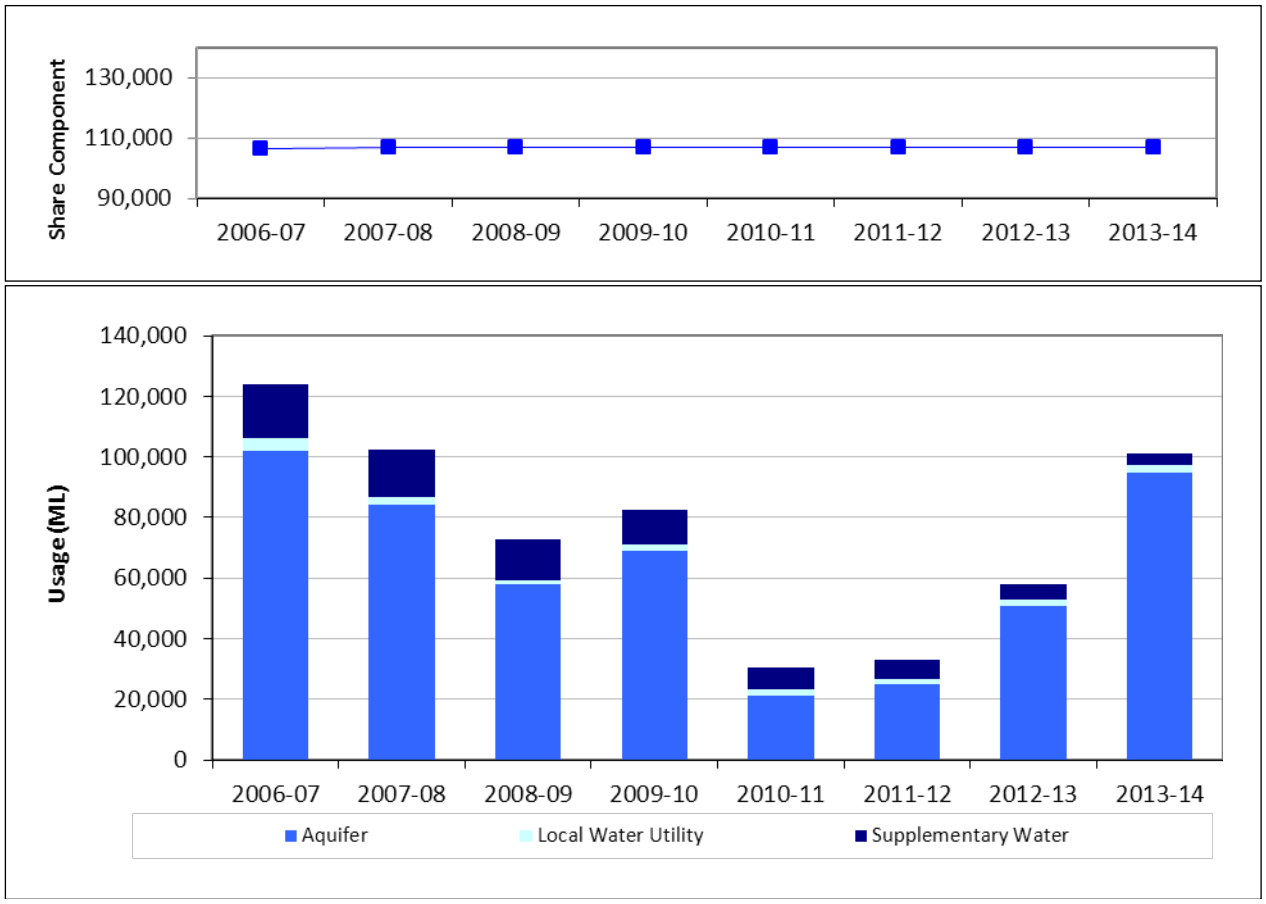
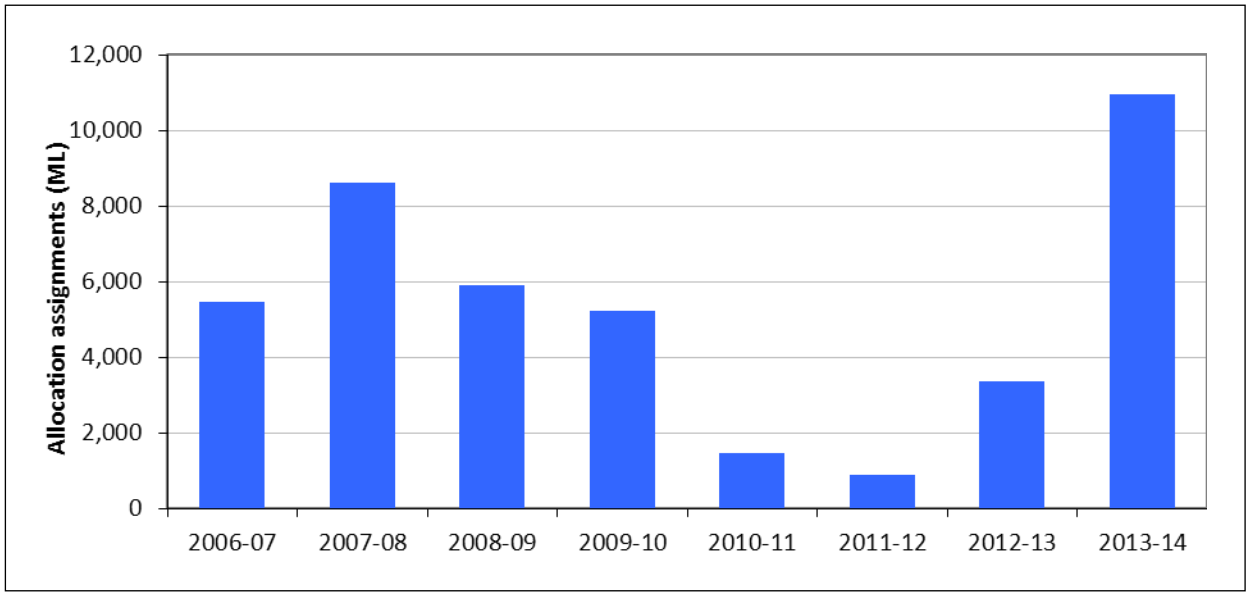


Figure 38: Allocation assignments within Aquifer licences in the Lower Namoi Groundwater Management Area



Groundwater account summaries

Table 35 provides a detailed 2013-14 account summary for the Upper and Lower Namoi groundwater sources. Below (Table 34) is a description of each of the components contained in the account summary.

Table 34: Explanatory information for allocation account summary

Heading		Description
Long term annual extraction limit		Requirement detailed under the water sharing plan aiming to allow protect the aquifer through sustainable long-term management. This volume excludes water made available to Supplementary licences.
Licence category		The relevant category of access licence as defined in the water sharing plans (Aquifer, Local Water Utility, Supplementary Water)
Share Component		This is the total volume of entitlement in the specific licence category on the last day of the accountable water year
Opening balance		The volume of water that has been carried forward from previous years allocation account.
AWD		Available Water Determination. The total annual volume of water added to the allocation account as a result of allocation assessments.
Assignments	In	Increase in account water as a result of temporary trade in.
	Out	Decrease in account water as a result of temporary trade out.
Account usage		Volume of water that is debited against the allocation accounts for usage
End of year balance		That part of the remaining account balance that is available to be taken at the conclusion of the water year.
End of year forfeit		Account water that is forfeited at the end of the water year as a result of carryover rules that restrict the carry forward volume.
Carry forward		This represents the account water that is permitted to be carried forward into the next water year as determined by the carryover rules.
( )		Negative figures are shown in red brackets

Table 35: Upper Namoi Groundwater Sources 2013-14 account summary

Category	Share Component	Opening Balance	AWD	Assignment In	Assignment Out	Account usage	Balance	End of Year Forfeit	Carry Forward
Upper Namoi Zone 1 Borambil Creek Groundwater Source									
Aquifer	384	768	883	11	11	286	1,365	597	768
Local Water Utility	1,216	(28)	1,216	30	30	664	524	524	0
Supplementary Water	1,718	0	481	0	0	275	206	206	0
Upper Namoi Zone 2 Cox's Creek (Mullaley To Boggabri) Groundwater Source									
Aquifer	7,141	12,530	7,141	1,143	1,143	9,546	10,125	601	9,523
Local Water Utility	59	0	59	0	0	20	39	39	0
Supplementary Water	5,953	0	1,191	0	0	1,113	78	78	0
Upper Namoi Zone 3 Mooki Valley (Breeza To Gunnedah) Groundwater Source									
Aquifer	17,101	32,802	17,101	2,008	2,008	21,427	28,476	1,794	26,682
Local Water Utility	198	0	198	0	0	113	85	85	0
Supplementary Water	8,065	0	1,613	0	0	1,445	168	168	0
Upper Namoi Zone 4 Namoi Valley (Keepit Dam To Gin's Leap) Groundwater Source									
Aquifer	21,032	35,999	21,032	3,461	3,461	21,845	35,186	5,140	30,046
Local Water Utility	4,660	0	4,660	0	0	2,527	2,133	2,133	0
Supplementary Water	13,611	(10)	2,722	0	0	2,167	545	545	0
Upper Namoi Zone 5 Namoi Valley (Gin's Leap To Narrabri) Groundwater Source									
Aquifer	15,992	25,169	15,992	1,505	1,505	19,841	21,321	2,091	19,230
Supplementary Water	2,712	0	977	0	0	941	36	36	0
Upper Namoi Zone 6 Tributaries Of The Liverpool Range (South To Pine Ridge Road) Groundwater Source									
Aquifer	11,448	22,896	11,448	0	0	1,558	32,786	9,890	22,896
Upper Namoi Zone 7 Yarraman Creek (East Of Lake Goran To Mooki River) Groundwater Source									
Aquifer	3,697	7,370	3,697	0	0	1,850	9,217	2,214	7,003
Supplementary Water	7	0	5	0	0	5	0	0	0
Upper Namoi Zone 8 Mooki Valley (Quirindi - Pine Ridge Road To Breeza) Groundwater Source									
Aquifer	16,122	28,882	16,122	734	734	18,447	26,557	2,115	24,442
Local Water Utility	50	(49)	50	0	0	57	(56)	0	(56)
Supplementary Water	4,898	0	980	0	0	952	28	28	0

Table 35: Upper Namoi Groundwater Sources 2013-14 account summary (continued)

Category	Share Component	Opening Balance	AWD	Assignment In	Assignment Out	Account usage	Balance	End of Year Forfeit	Carry Forward
Upper Namoi Zone 9 Cox's Creek (Up-Stream Mullaley) Groundwater Source									
Aquifer	11,245	22,230	11,245	0	0	4,079	29,396	8,567	20,829
Local Water Utility	97	0	97	0	0	38	59	59	0
Upper Namoi Zone 10 Warrah Creek Groundwater Source									
Aquifer	1,420	2,840	1,420	0	0	0	4,260	1,420	2,840
Upper Namoi Zone 11 Maules Creek Groundwater Source									
Aquifer	2,223	4,322	2,223	154	154	675	5,870	1,740	4,130
Supplementary Water	15	0	5	0	0	0	5	5	0
Upper Namoi Zone 12 Kelvin Valley Groundwater Source									
Aquifer	1,999	3,998	1,999	0	0	783	5,214	1,301	3,914
Supplementary Water	775	0	279	0	0	156	124	124	0

Table 36: Lower Namoi Groundwater Source 2013-14 account summary

Category	Share Component	Opening Balance	AWD	Assignment In	Assignment Out	Account usage	Balance	End of Year Forfeit	Carry Forward
Aquifer	81,586	147,708	81,586	10,968	10,968	94,807	134,488	13,539	120,949
Local Water Utility	4,407	0	4,407	0	0	2,563	1,844	1,844	0
Supplementary Water	20,759	0	4,175	0	0	3,613	539	539	0

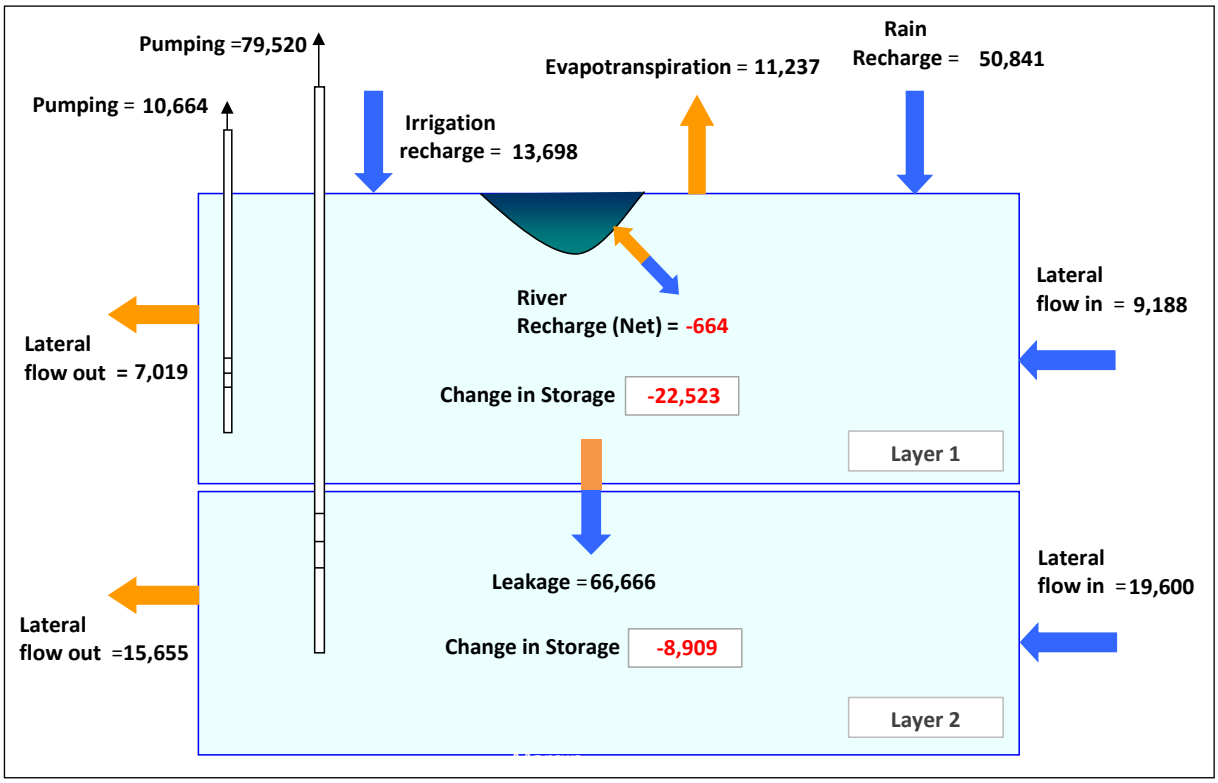
Physical groundwater flows

The following section provides information on physical groundwater flows. For the Upper and Lower Namoi groundwater sources detailed annual water budgets are produced by the NSW Office of Water groundwater planning models (developed using MODFLOW) (see Method A in the document NSW General Purpose Water Accounting Reports - Groundwater Methodologies, available for download from the NSW Office of Water website). Figures illustrating change in groundwater levels during 2013-14 are also presented for these water sources. These level change estimates were obtained by the contouring of available monitoring bore data (levels) within the groundwater sources.

For the areas outside of the Upper and Lower Namoi groundwater sources, where no planning model is available, and there is insufficient monitoring bore data to estimate a complete budget, the NSW Office of Water's soil water budget accounting method was applied to obtain an estimate of the potential recharge for 2013-14. This method uses daily gridded physical and climatic information to estimate a recharge via a simple book keeping technique that tracks the balance between the inflow of water from precipitation and the outflow of water by evapotranspiration, stream flow and drainage (potential groundwater recharge). A detailed description of this method is available in 'General Purpose Water Accounting Reports - Groundwater methodologies' (referred to as method C) and can be accessed via the NSW Office of Water website. This method was also used to provide a historic estimate for relative comparisons (see Figure 44). This indicates that for 2013-14 potential recharge was significantly less than average and the lowest in a 10 year sequence.

It is important to note that the data presented is modelled data produced for the purpose of providing relative year to year comparisons in groundwater movements. Care should be taken if using this data outside the context of this report.

Figure 39: Upper Namoi groundwater combined sources physical flow budget 2013-14[32]



[32] All figures stated are megalitres

Figure 40: Upper Namoi Groundwater Management Areas, change in groundwater levels 2013-14 (based on monitoring bore data)

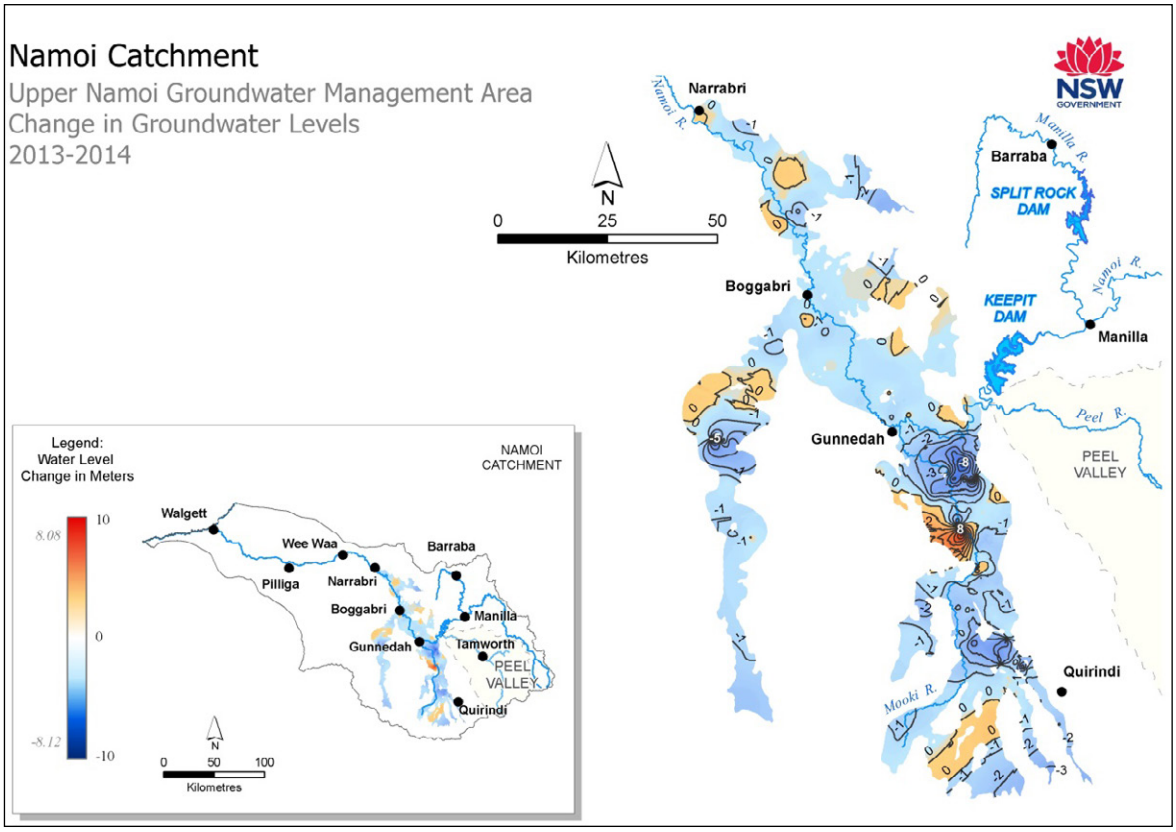


Figure 41: Lower Namoi groundwater combined sources physical flow budget 2013-14

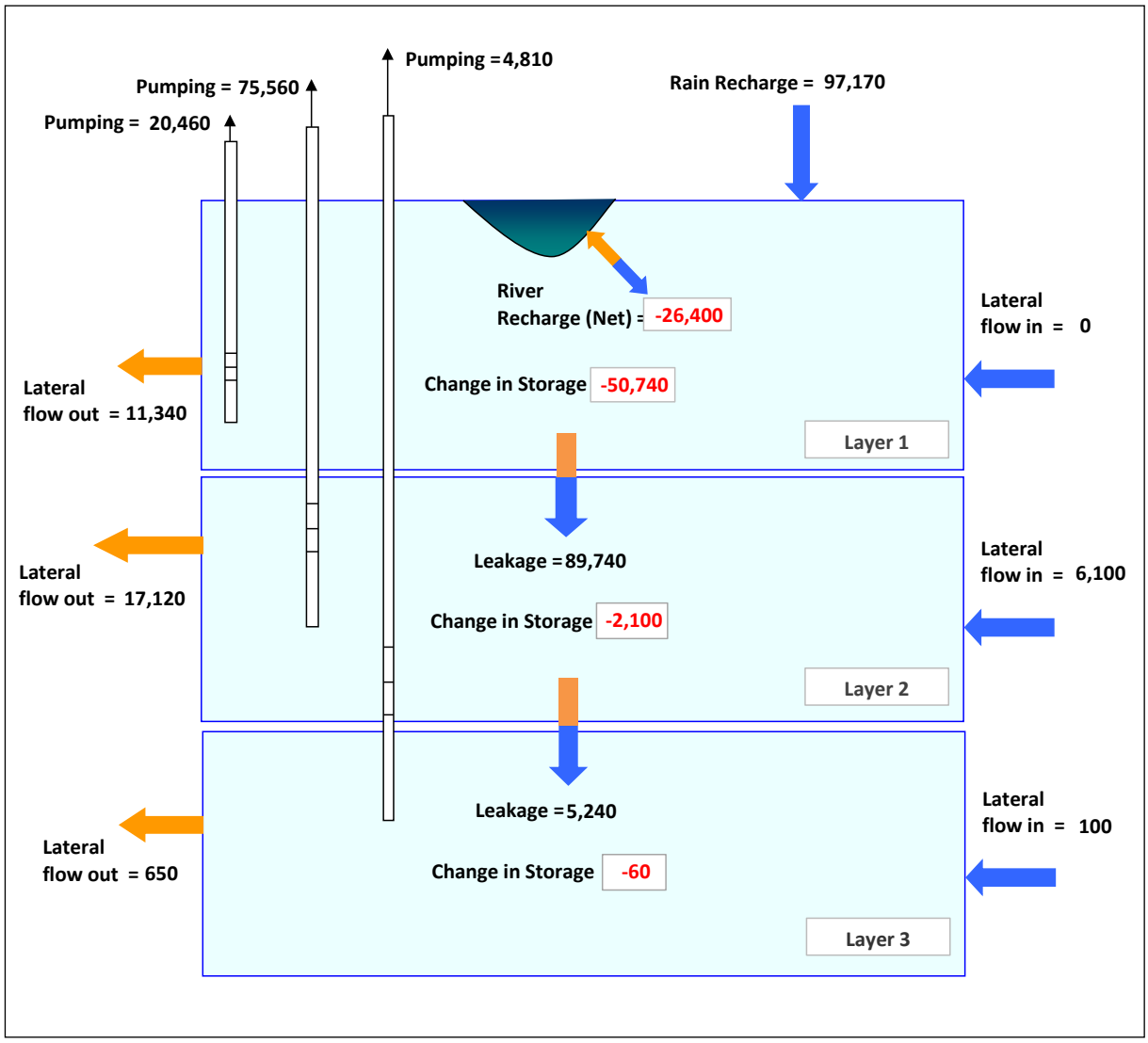


Figure 42: Lower Namoi Groundwater Management Areas, change in groundwater levels 2013-14 (based on monitoring bore data)

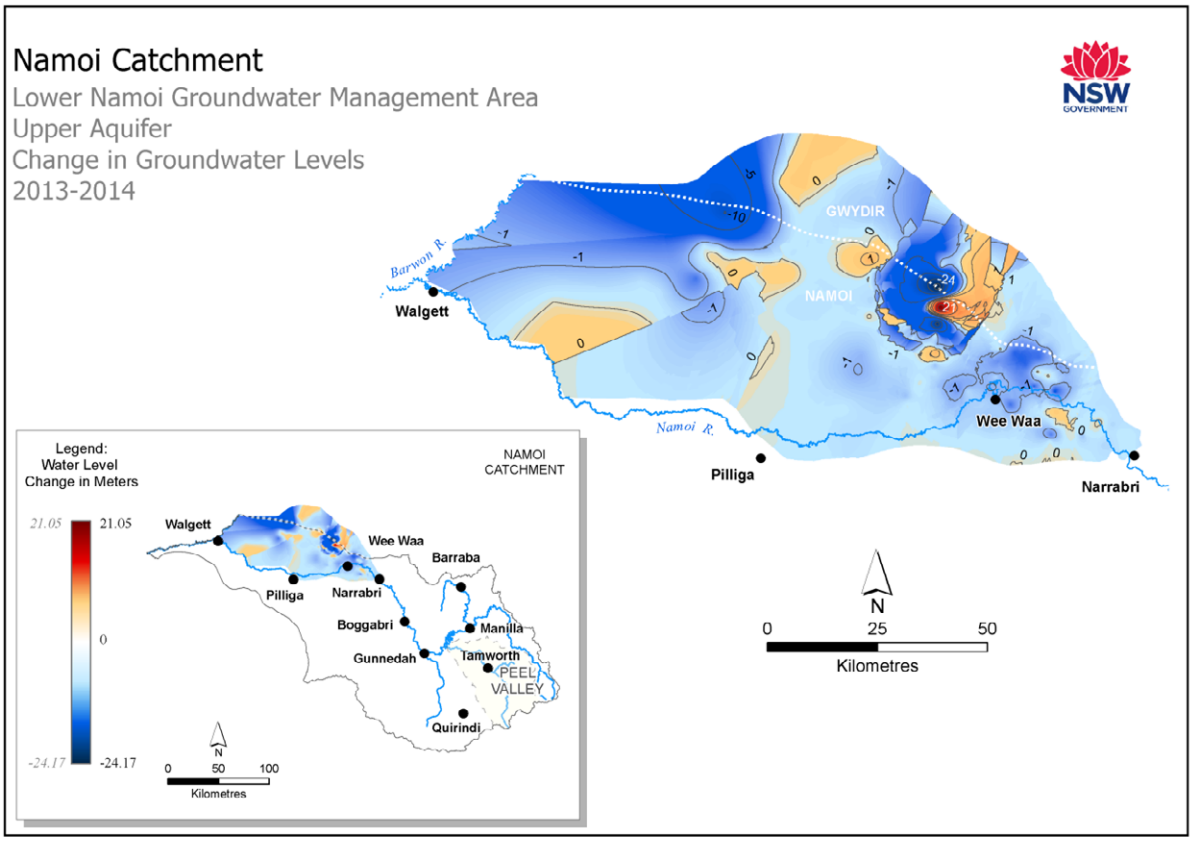


Figure 43: Potential recharge deviation non-modelled areas 2013-14

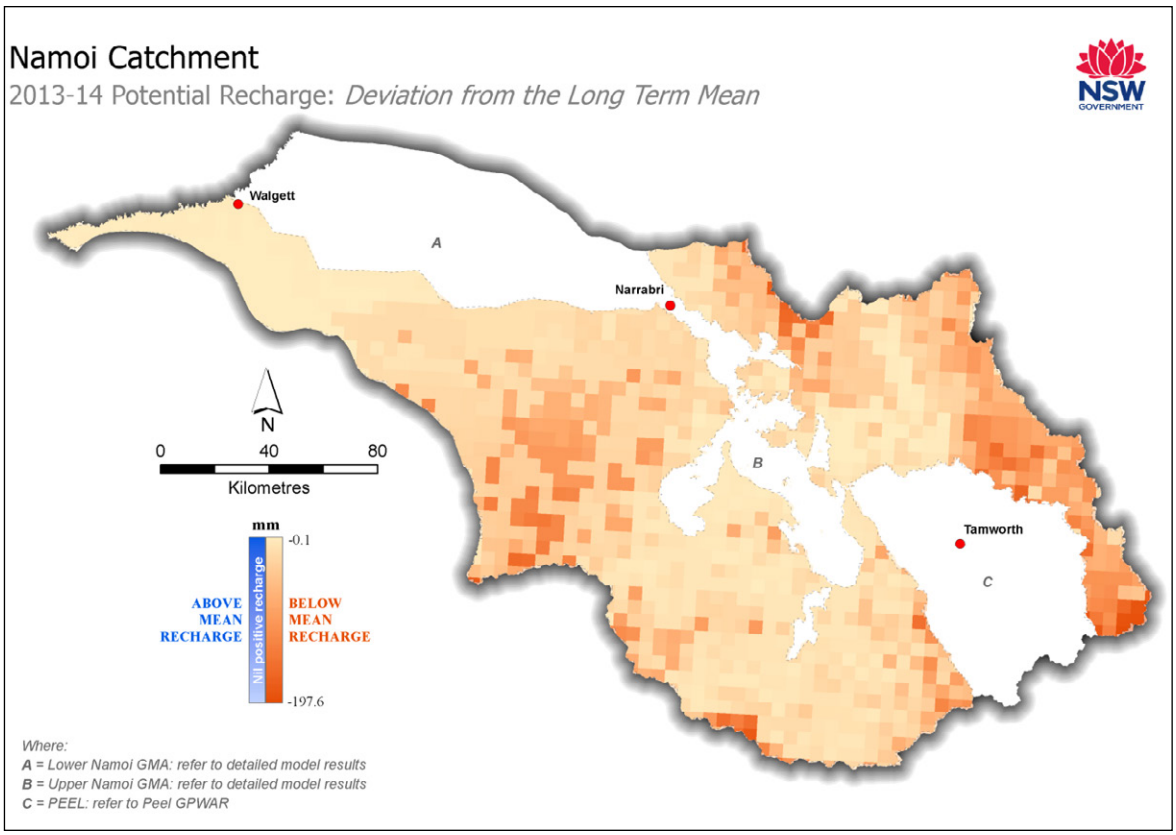
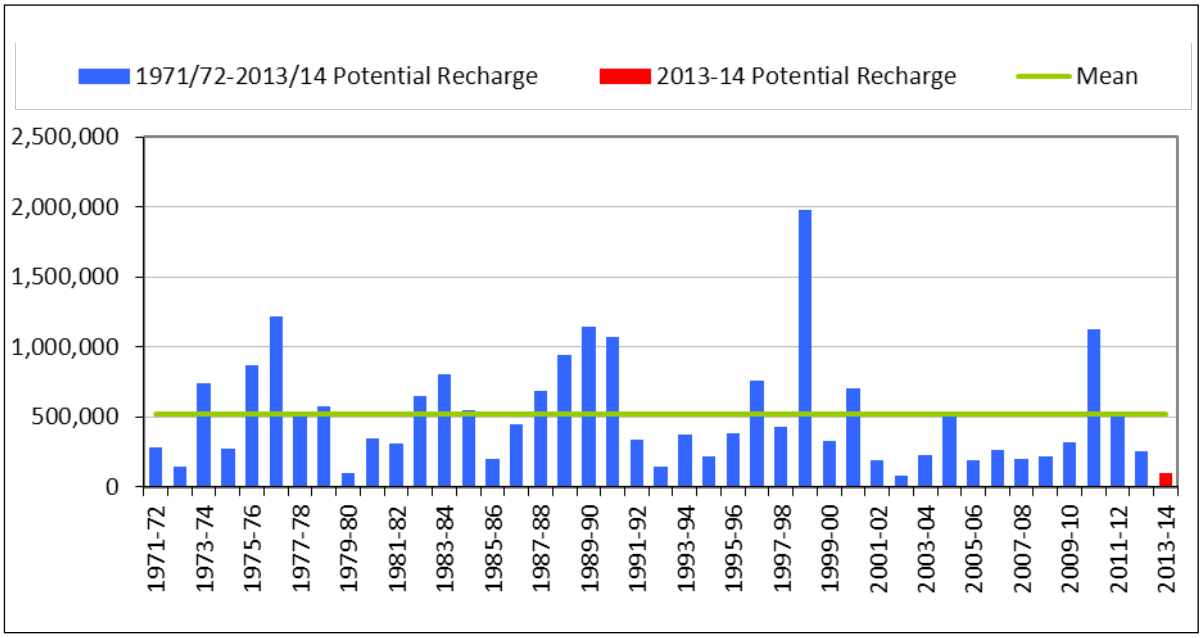


Figure 44: Namoi catchment, non-modelled areas annual potential recharge (1971-72 to 2013-14)



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