

Department of Climate Change, Energy, the Environment and Water



# General Purpose Water Accounting Report Peel Catchment

2022-2023



# Acknowledgement of Country

The Department of Climate Change, Energy, the Environment and Water acknowledges that it stands on Aboriginal land.

We acknowledge the people of the Gomeroi/Kamilaroi Nation hold the land and waters of the Peel River catchment area is of spiritual, cultural, customary and economic importance.

We recognise the intrinsic connection of Traditional Owners to Country and acknowledge their contribution to the management of the Peel River catchment landscape and natural resources.

Published by NSW Department of Climate Change, Energy, the Environment and Water [dceew.nsw.gov.au](https://dceew.nsw.gov.au)

General Purpose Water Accounting Report Peel Catchment

First published: February 2023

ISBN/ISSN: 2652-497X

Department reference number: PUB23/1256

More information

Water Information Team, NSW Department of Climate Change, Energy, the Environment and Water

Acknowledgements

This report may be cited as NSW Department of Climate Change, Energy, the Environment and Water (2023) General Purpose Water Accounting Report Peel Catchment

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# Abbreviations

Acronym	Description
ARCGIS	mapping and spatial analysis platform for designing and managing solutions through the application of geographic knowledge
AWAS 1	Australian Water Accounting Standard 1
AWD	available water determination
CAIRO	computer-aided improvements to river operations
DISV	dry inflow sequence volume
EWA	environmental water allowance
GIS	geographic information system
GPWAR	general purpose water accounting report
IQQM	integrated quantity and quality model
ML	megalitres (1,000,000 litres)
ML/d	megalitres per day
SILO	climatic data provision system run by the Queensland Government for the provision of both measured and modelled data
WSP	water sharing plan

# Glossary

Term	Definition
<b>allocation</b>	the specific volume of water allocated to water allocation accounts in a given season, defined according to rules established in the relevant water plan
<b>allocation assignments</b>	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.
<b>allocation account</b>	water account attached to an access licence used to track the balance of account water
<b>available water determination (AWD)</b>	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 individual's licence allocation account.
<b>Australian Water Accounting Standard (AWAS)</b>	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.
<b>back-calculation</b>	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)
<b>basic rights</b>	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.
<b>computer aided improvements to river operations (CAIRO)</b>	a spreadsheet-based water balance model used for optimising river operations (orders and releases)
<b>carryover</b>	the volume or share component that may be reserved by a licence holder for use in the subsequent year
<b>catchment</b>	the areas of land that collect rainfall and contribute to surface water (streams, rivers, wetlands) or to groundwater A catchment is a natural drainage area, bounded by sloping ground, hills or mountains, from which water flows to a low point.

Term	Definition
<b>dead storage</b>	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
<b>effective storage</b>	the total volume of storage minus the dead storage component—the volume generally considered as useable
<b>effluent</b>	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.
<b>entity</b>	a defined geographical area or zone within the accounting region Transactions and reports are produced for each entity.
<b>end of system</b>	the last defined point in a catchment where water information can be measured and/or reported
<b>environmental water</b>	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.
<b>evaporation</b>	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.
<b>evapotranspiration</b>	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
<b>extraction</b>	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.).
<b>general purpose water accounting report (GPWAR)</b>	a report prepared according to the Australian Water Accounting Standard It comprises 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.
<b>General Security licence</b>	a category of water access licence implemented under the <i>Water Management Act 2000</i> This forms the bulk of the water access licence entitlement volume in NSW and is a low-priority entitlement (i.e. it only receives water once essential and High Security entitlements are met in the available water determination process).

Term	Definition
<b>groundwater</b>	Water location beneath the ground in soil pore spaces and in the fractures of rock formations
<b>High Security licence</b>	a category of water access licence implemented under the <i>Water Management Act 2000</i> It receives a higher priority than General Security licences but less priority than essential requirements in the available water determination process.
<b>HYDSTRA database</b>	a database used by NSW Department of Climate Change, Energy, the Environment and Water to store continuous, time-series data such as river flow, river height, and water quality
<b>inflows</b>	surface water runoff and deep drainage to groundwater (groundwater recharge) and transfers into the water system (both surface and groundwater) for a defined area
<b>inter-valley trade</b>	trade of licence holder allocation account water via allocation assignment from one catchment to another catchment (or state)
<b>intra-valley trade</b>	trade of licence holder allocation account water via allocation assignment within the same catchment
<b>median</b>	the middle point of a distribution, separating the highest half of a sample from the lowest half
<b>non-physical transaction</b>	an accounting transaction representing a process that is not a component of the water cycle (e.g. an available water determination)
<b>physical transaction</b>	an accounting transaction representing a process of the water cycle (e.g. an extraction)
<b>regulated river</b>	a river system where flow is controlled via one or more major man-made structures such as dams and weirs  For the purposes of the <i>Water Management Act 2000</i> , 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.
<b>share component</b>	an entitlement to water specified on the access licence, expressed as a unit share or, in the case of specific purpose licences (e.g. 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.
<b>storage</b>	a state-owned dam, weir or other structure that is used to regulate and manage river flows in the catchment and the water bodies impounded by these structures

Term	Definition
<b>storage reserve</b>	proportion of water in a storage reserved in the resource assessment process for future essential or High Security requirements (e.g. town water)
<b>storage volume</b>	the total volume of water held in storage at a specified time
<b>supplementary water</b>	unregulated river flow available for extraction under a Supplementary Water licence
<b>surface water</b>	all water that occurs naturally above ground including rivers, lakes, reservoirs, creeks, wetlands and estuaries
<b>tributary</b>	a smaller river or stream that flows into a larger river or stream Usually a number of smaller tributaries merge to form a river.
<b>ungauged catchment</b>	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.
<b>water accounting</b>	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
<b>water assets</b>	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 inter-valley trading)
<b>water liabilities</b>	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
<b>water sharing plan</b>	a water management plan that defines the rules for sharing of water within a region under the <i>Water Management Act 2000</i>

# Director's foreword

This is the 12th annual release of the general-purpose water accounting report (GPWAR) for the Peel Regulated River Water Source. It has been prepared for the accounting period 1 July 2022 to 30 June 2023 (the reporting period), under the Australian Water Accounting Standard 1 (AWAS 1) (WASB, 2012).

The GPWAR provides stakeholders with a consolidated, comparable and publicly accessible set of water accounting information for the water source. The information presented is also used internally for a range of water planning functions and legislative reporting obligations.

Included in the GPWAR are:

- a contextual statement summarising the climatic conditions, water resources, environmental holdings, water trading market and water resource management in the water source for 2022–23
- 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 including:
  - access licence account balances
  - planned and held environmental water account balances
  - a detailed available water determination report
  - temporary trading by licence category
  - supplementary announcements and usage by river reach
  - physical inflows and outflows to the system for the water year.

Reporting datasets used in the GPWAR are available by sending an email request of your required information to [water.wams@dpi.nsw.gov.au](mailto:water.wams@dpi.nsw.gov.au)

As Director Water Analytics, NSW Department of Climate Change, Energy, the Environment and Water, I declare:

- the information presented in these accounts is a faithful representation of the management and operation of the regulated Peel water source for the reporting period
- all data presented in this report is based on the best available information at the time of publication
- NSW Department of Climate Change, Energy, the Environment and Water has, to the best of its ability, prepared this GPWAR in accordance with the Australian Water Accounting Standard 1.

**Danielle Baker**

Director Water Analytics

NSW Department of Climate Change, Energy, the Environment and Water

# Contextual statement

The Peel River catchment is a major sub-catchment of the Namoi River, covering an area of 4,700 square kilometres. The Peel River forms in the northern slopes of the Liverpool range, flowing northwest for approximately 210 kilometres to the systems junction with the Namoi River near Gunnedah. Around 40% of the annual discharge flowing from the Peel is contributed by the Cockburn River, while Goonoo Goonoo and Dungowan Creeks both contribute approximately 10%.

The Peel River system is regulated by Chaffey Dam, which is in the upper catchment near the town of Woolomin, approximately 45 kilometres from Tamworth. Chaffey Dam was completed in 1979. It has a capacity of approximately 62,000 megalitres and a contributing catchment area of 420 square kilometres. Work undertaken to increase dam capacity to 100,500 megalitres was completed in May 2016. The storage is a shared resource that services both the town water supply needs of Tamworth and agricultural production in the area.

Tamworth water supply is also supplemented by Dungowan Dam, which is owned and operated by Tamworth Regional Council. Dungowan Dam is in the upper reaches of Dungowan Creek and has a total capacity 6,300 megalitres.

The Peel catchment supports around 66 square kilometres of irrigation, most of which is for irrigated pasture or fodder crops.

The Peel is managed and operated independently of the Namoi regulated river water sources.

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## Accounting extent

The accounted river extent is illustrated in Figure 1 and includes the regulated Peel water source, as defined by the *Water Sharing Plan for the Peel Regulated River Water Source 2010*.

Gauged inflow for the accounted Peel system is the total annual inflow from Goonoo Goonoo Creek at Meadow Lane, the Cockburn River at Mulla Crossing and Dungowan Creek upstream of Dungowan. Combined with Chaffey Dam catchment area the inflow for the account that is measured and indirectly measure is approximately 50%.

Dungowan Dam is not a dedicated resource for the Peel Regulated River<sup>1</sup>, however river releases and excess flow passing Dungowan Dam contribute inflow to the regulated river. Due to this connectivity, and contribution to town water supply for Tamworth, information on the Dungowan system has been provided for contextual purposes, however only the contributing flow from Dungowan creek (measured at 419103) is being considered when accounting the Peel River Regulated water source.

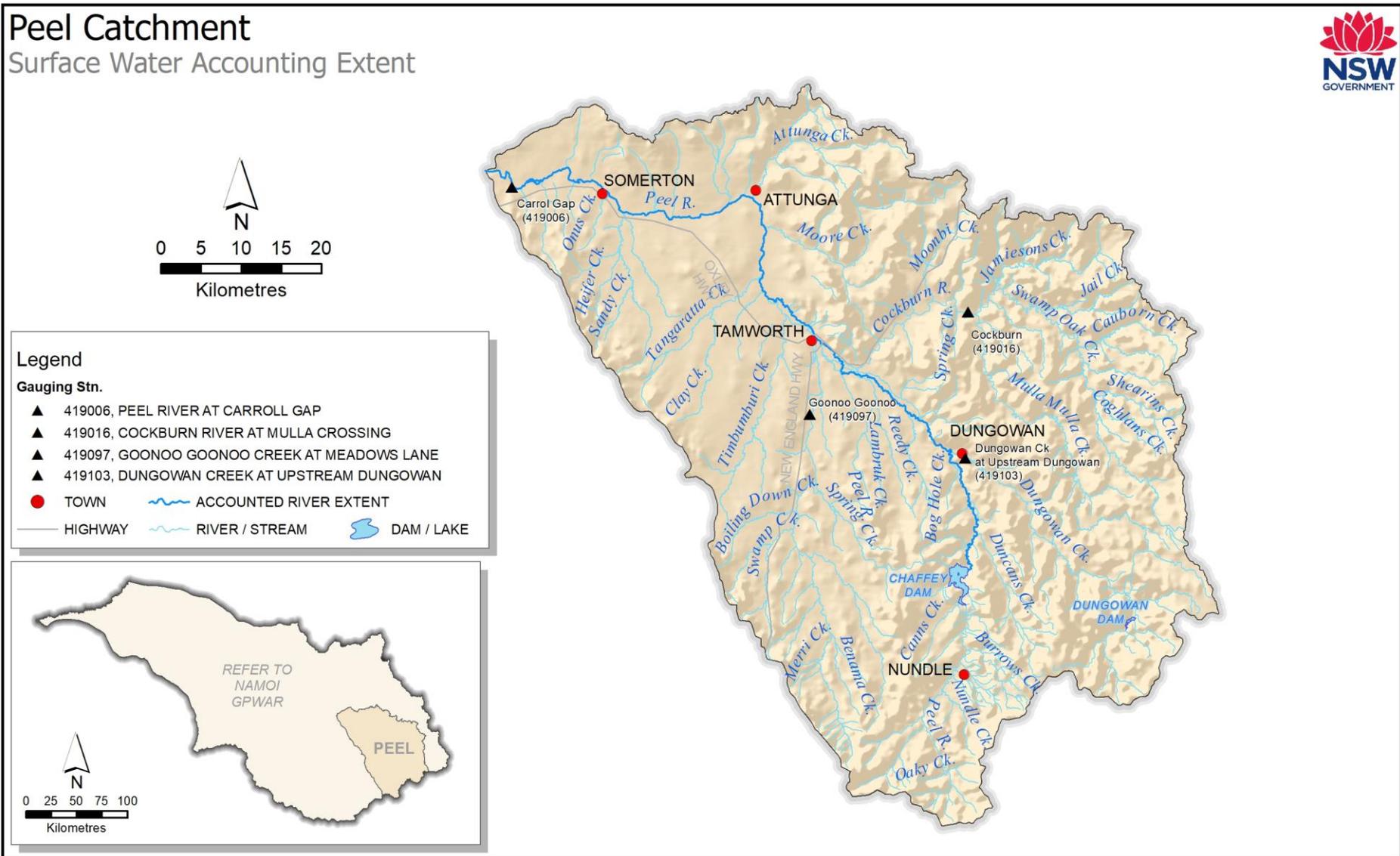
While physical groundwater volumes that interact with the regulated river are included in GPWAR statements where possible (and any interactions not directly estimated form part of the unaccounted

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<sup>1</sup> Dungowan Dam take is managed within the Upper Peel River tributaries water source

difference), all other groundwater flows and groundwater management information are excluded from this GPWAR.

Figure 1: Surface water geographical extent of the accounts

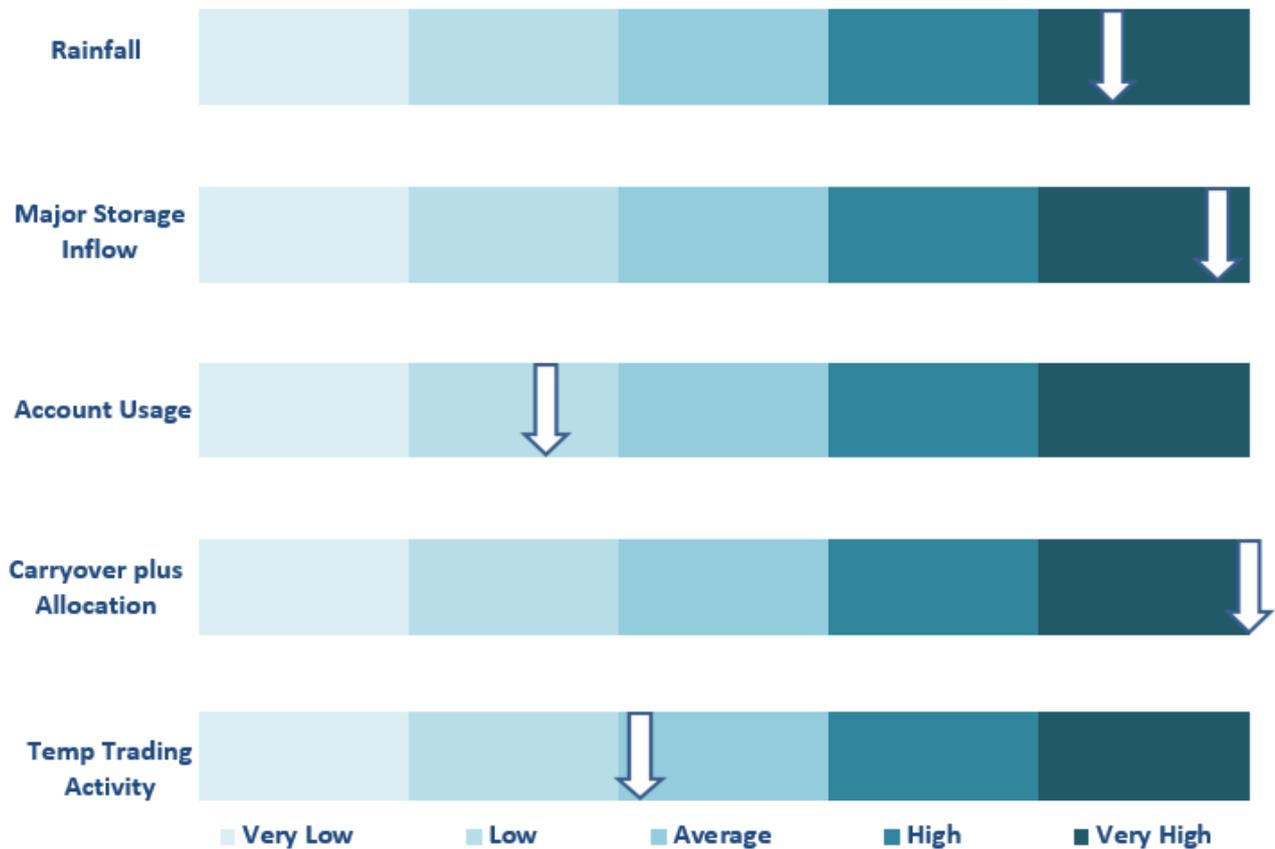


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## Snapshot

The key indicators for 2022–23 relative to other years under water sharing plan management conditions are presented in Figure 2. Rainfall, major storage inflow and carryover plus allocation were in the very high indicator range for the year. Account Usage was in the low range and temporary trading volumes reflected average demand for allocation.

Figure 2: Reporting year summary indicators



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## Climate

At Tamworth (central catchment), 903 mm of rainfall was recorded in the reporting period (Table 1)

Comparatively this rainfall is:

- 134% of the long-term median rainfall (for this location)
- 87% of the highest annual (July to June) rainfall on record for this location (1,032 mm)

Significant monthly rainfall occurred in September and October 2022 (150 mm) and March 2023 (186 mm) (Figure 3 and Figure 4). The 2022–23 spatial rainfall distribution across the Peel is displayed in Figure 5, and can be referenced against the mean historical annual rainfall distribution in Figure 6. Rainfall volumes were well above the historical reference period, across the full extent of the catchment.

Figure 3: Monthly rainfall for the reporting period compared with historical monthly median rainfall at Tamworth (Hillgrove)

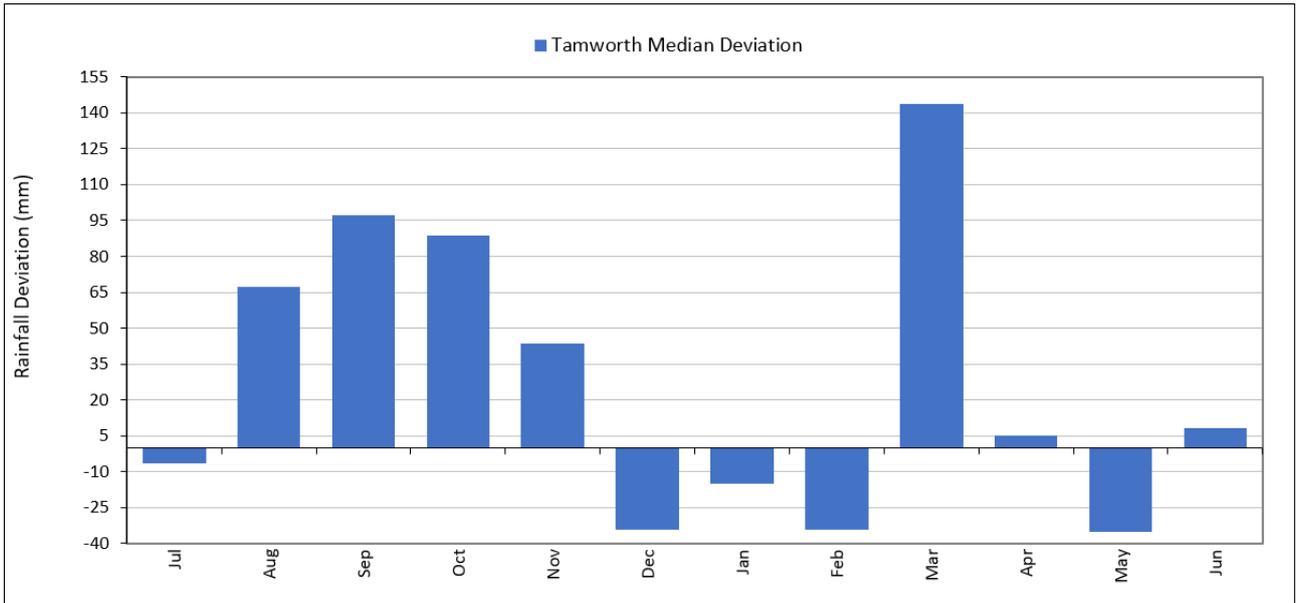


Figure 4: Monthly rainfall deviation for the reporting period from historical monthly median rainfall at Tamworth (Hillgrove)

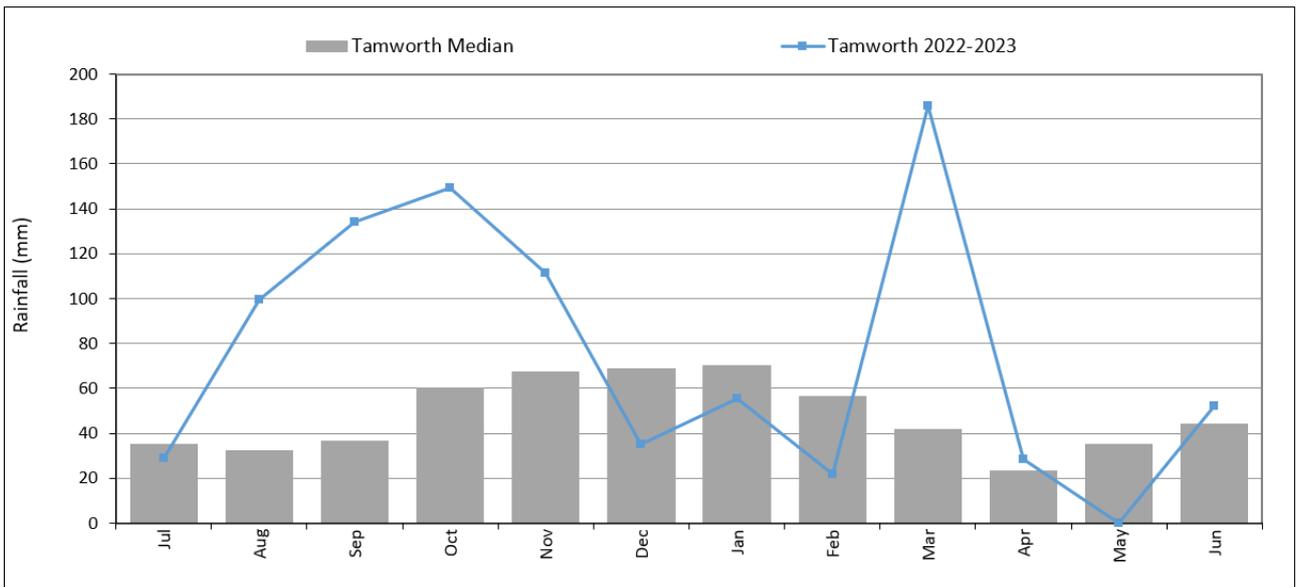


Table 1: Monthly rainfall and historic monthly rainfall statistics at Tamworth<sup>2</sup>—measurements in millimetres

Tamworth	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
<b>2022–23</b>	28.8	99.6	134.1	149.5	111.2	34.9	55.6	22.0	185.7	28.6	0.1	52.4	902.5
<b>Historical mean</b>	47.3	40.0	48.6	57.6	82.8	76.8	85.6	64.7	52.9	36.1	40.1	48.0	676.0
<b>Historical median</b>	35.2	32.4	36.8	60.6	67.7	69.0	70.6	56.5	41.9	23.4	35.2	44.4	671.5
<b>Historical lowest</b>	3.3	0.0	0.6	7.8	5.3	3.1	2.6	2.2	0.0	0.0	0.0	1.6	372.6
<b>Historical highest</b>	183.6	139.6	154.0	149.5	287.4	202.1	363.8	225.8	185.7	140.8	158.7	166.2	1032.4
<b>Year of highest<sup>3</sup></b>	1985-86	1986-87	2015-16	2021-22	2007-08	2006-07	1975-76	2011-12	2022-23	1998-99	1976-77	2004-05	1976-77

<sup>2</sup> Monthly data sourced from SILO, Climate Data Online—[SILO-Longpaddock](#). All statistics were derived the monthly data. The data is for the station Tamworth (Hillgrove), station code 55279

<sup>3</sup> Calendar year for monthly highs and water year (July–June) for annual

Figure 5: Peel annual rainfall in reporting period

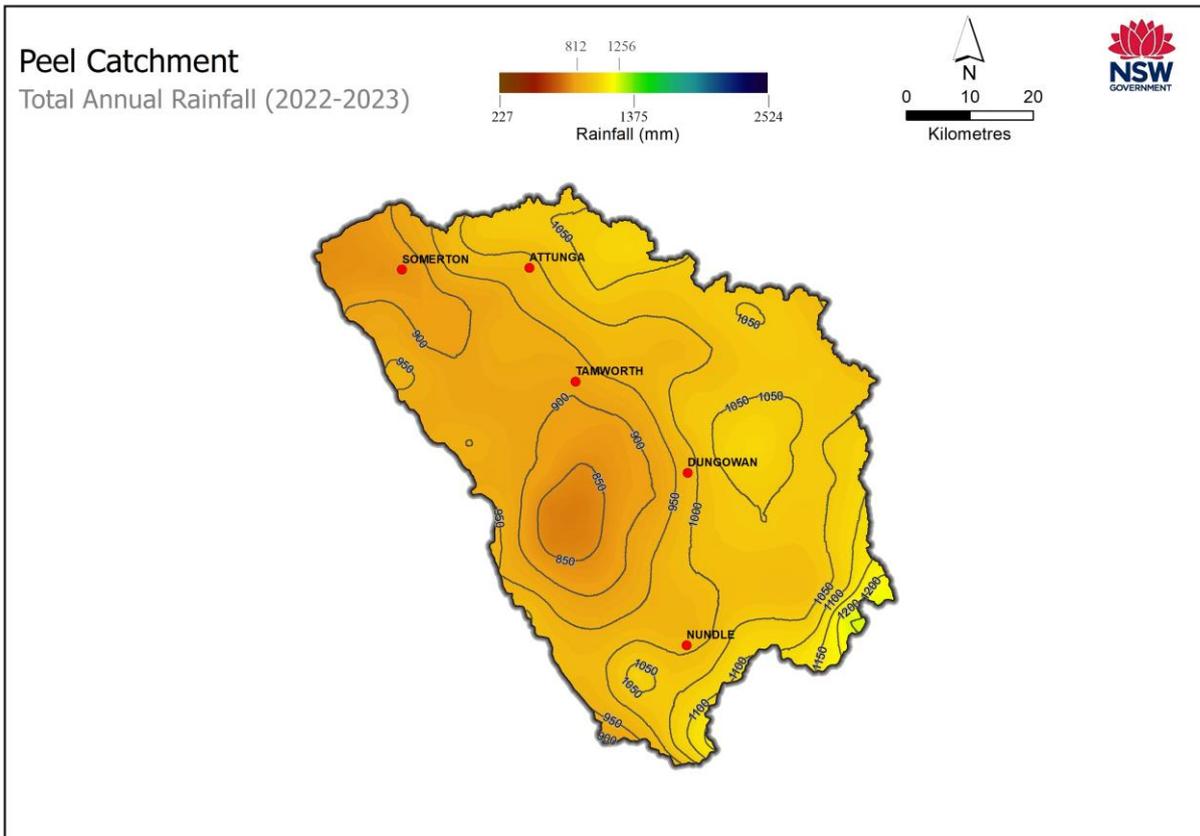
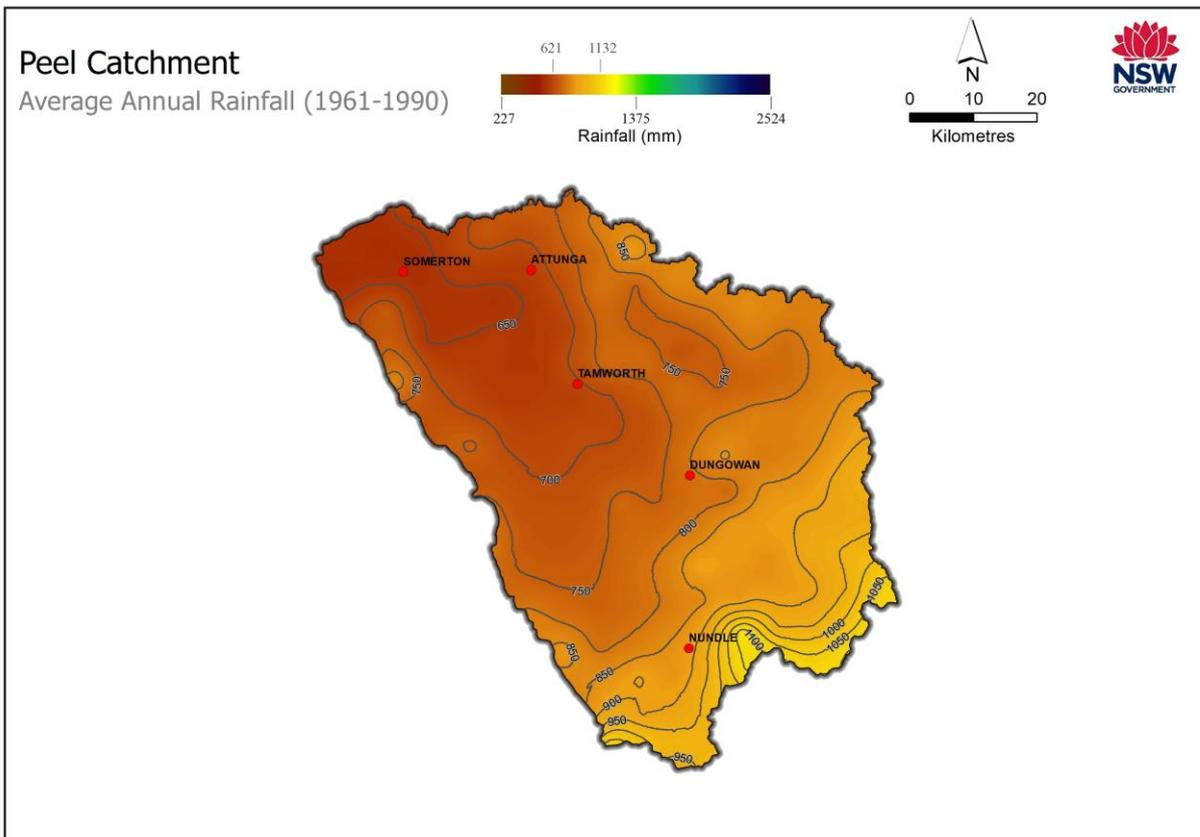


Figure 6: Average annual rainfall in the Peel catchment (1961–90)



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## Storage inflows and volume

### Inflows

Inflow to Chaffey Dam has historically varied significantly, cycling through prolonged periods of predominantly dry (1894-01, 1924-49) and predominantly wet climatic regimes (1949-57, 1984-91). Since 2000, the system has experienced short durations of wet and prolonged durations of dry (Figure 7).

Currently, the trend is upwards, indicating generally wetter conditions compared to the long-term sequence.

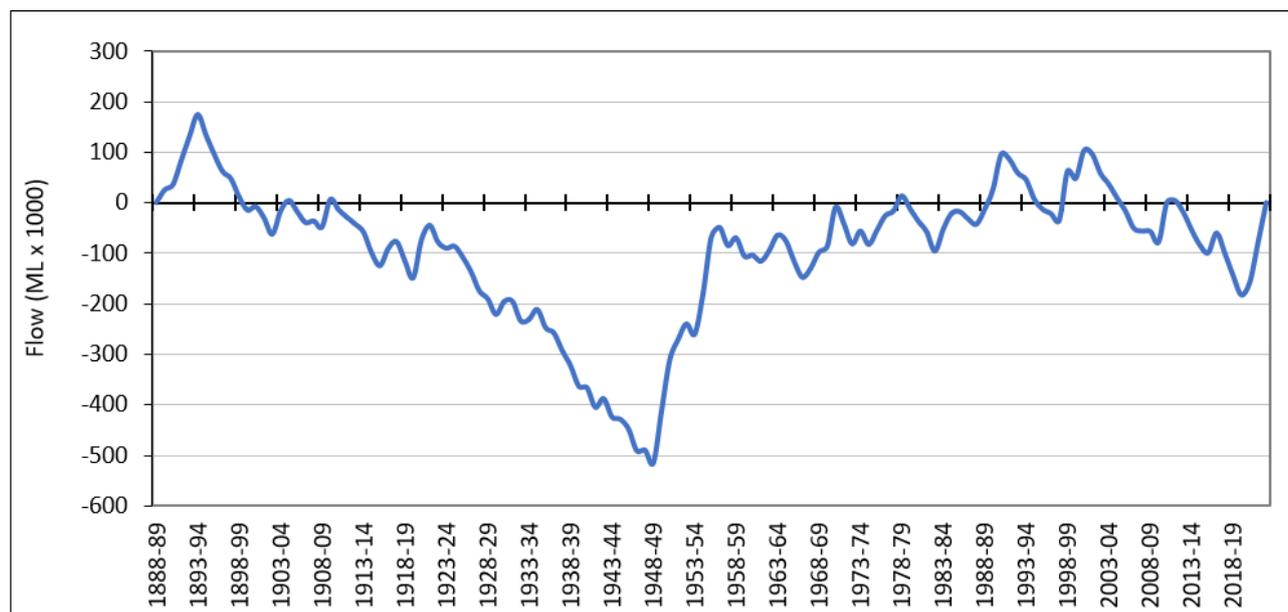
For the reporting period, the total inflow to Chaffey Dam was 122,842 megalitres (), which is:

385% of the long-term median annual inflow (32,321 megalitres)

- very high relative to the historical record<sup>4</sup>, exceeding 97% of years in the long-term series (1890-91 to 2022-23)
- the 3rd consecutive year of above average inflow.

Daily inflows are presented in (Figure 10). The maximum daily inflow rate of 16,470 megalitres occurred on 1 November 2022.

Figure 7: Chaffey Dam long-term inflow trend (cumulative deviation)



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<sup>4</sup> Inflows are produced by a back-calculation (mass-balance approach), for the period since storage commissioning. Prior to this, the series is composed of gauged data (where available) and rainfall runoff modelling data.

Figure 8: Long-term inflows to Chaffey Dam against mean and reporting year inflow

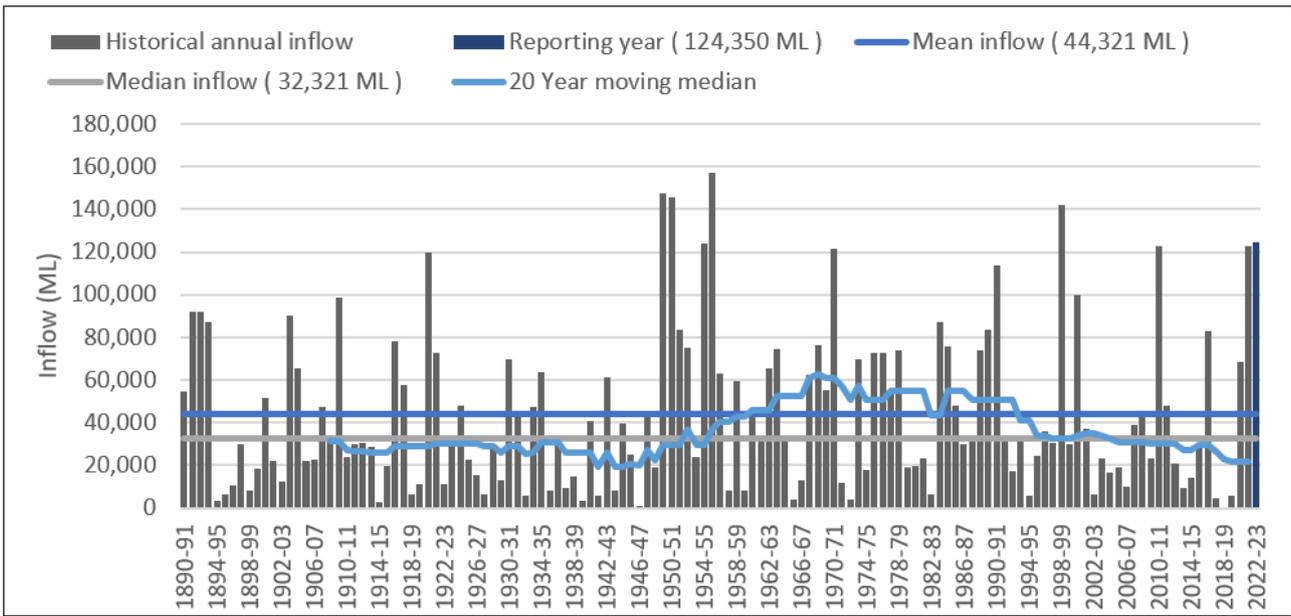


Figure 9: Historical inflows at Chaffey storage site represented as cumulative days below mean

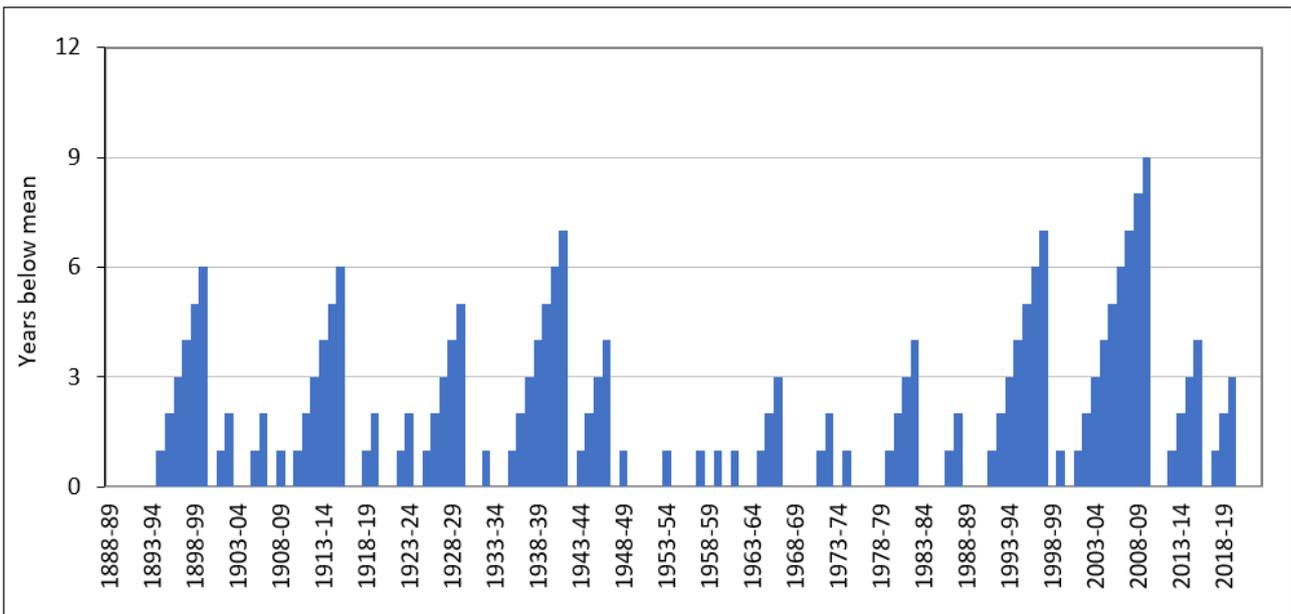
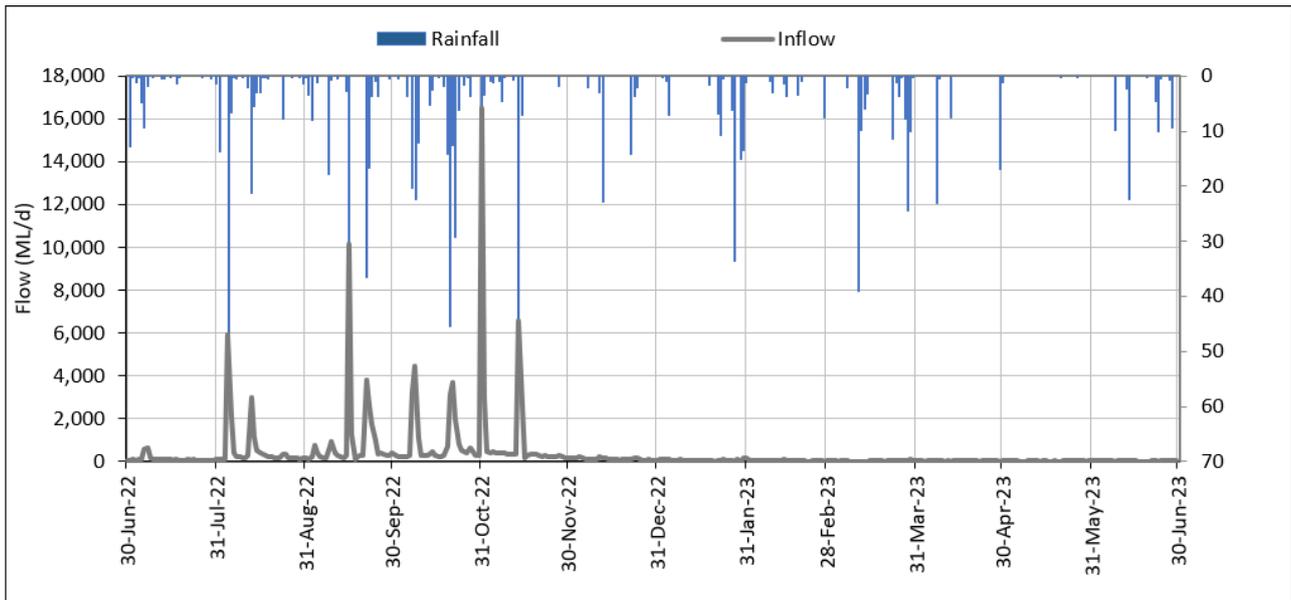


Figure 10: Daily inflows and rainfall at Chaffey Dam for the reporting period



## Storage volume

For the reporting period Chaffey Dam:

- had an opening volume of 102,985 megalitres or 102% of full supply capacity
- had a closing volume of 102,965 megalitres or 102% of full supply capacity
- held a maximum volume of 109,322 megalitres, being 109% of full supply volume, on 1 November 2022 (Figure 11).

Figure 11: Chaffey Dam storage volume and % full (reporting year) and historical volume sequence

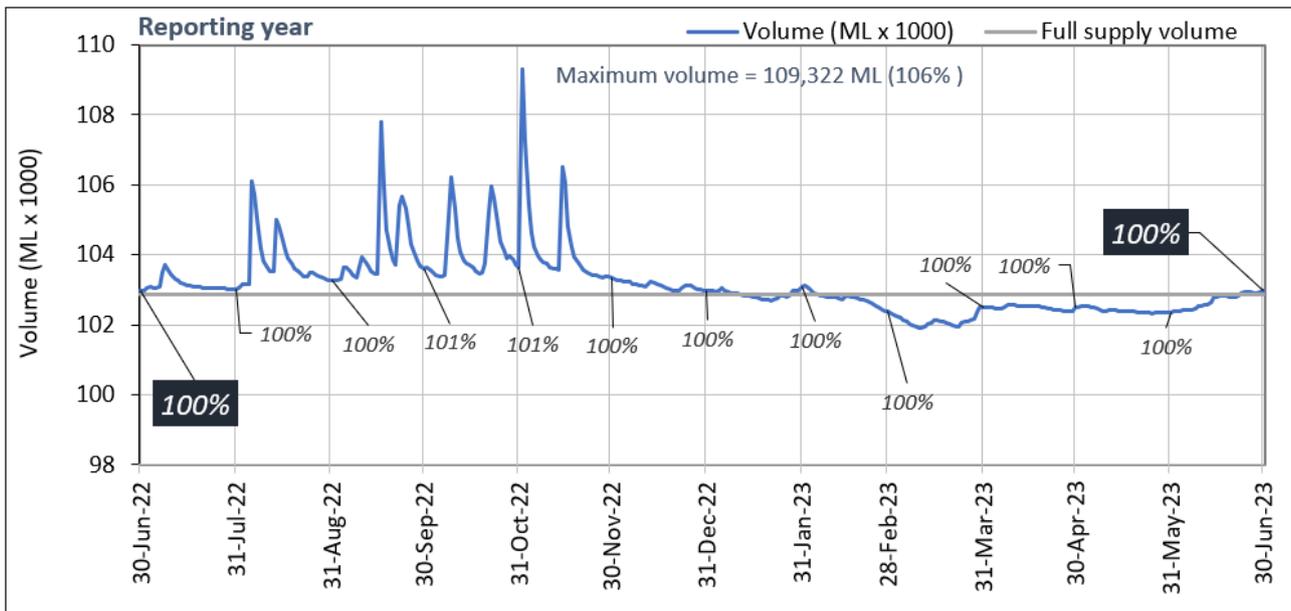
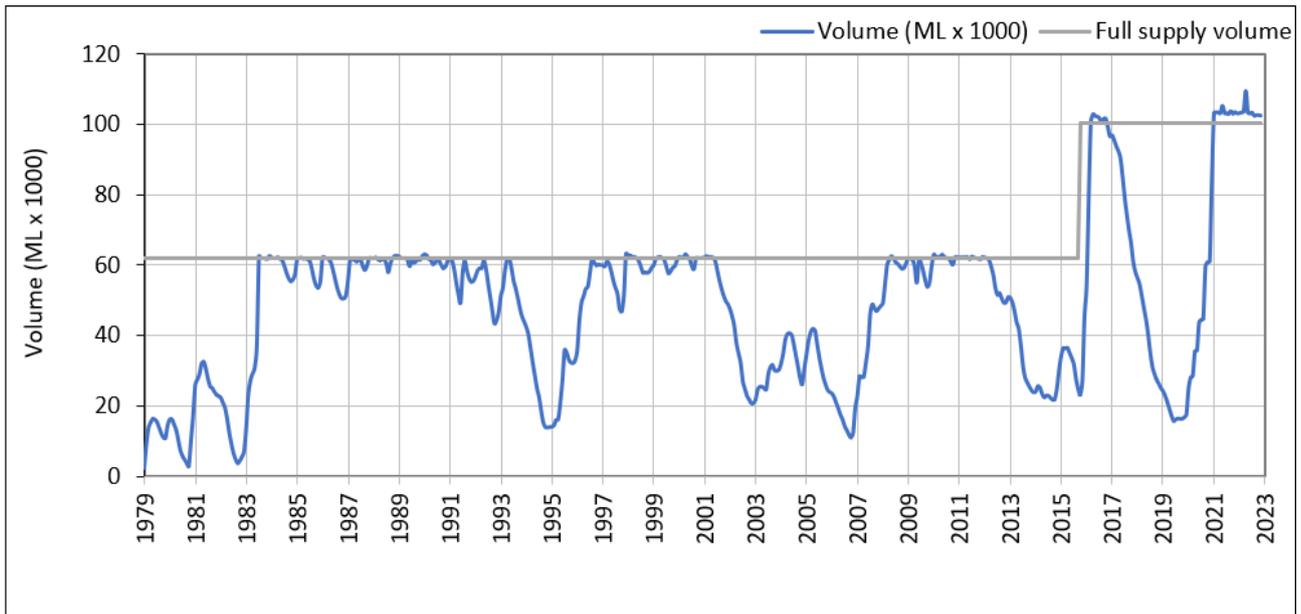


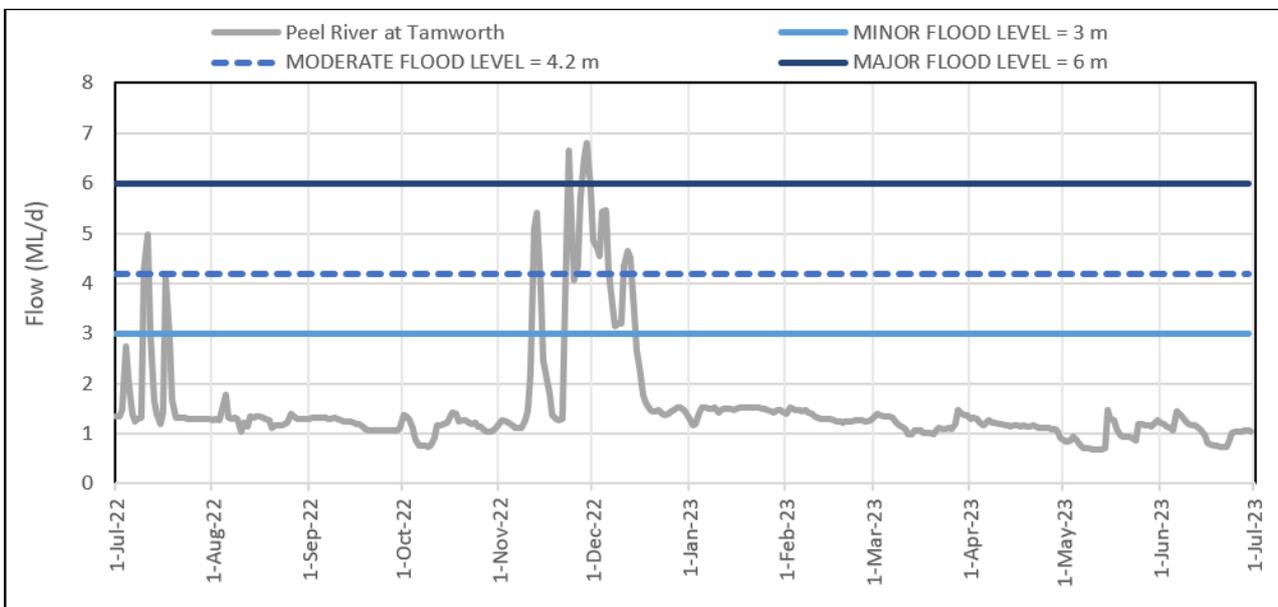
Figure 12: Chaffey Dam historical storage volumes against full supply volume



## Major flow events

The river height at Tamworth exceeded the major flooding indicator level in November 2022<sup>5</sup> (Figure 13), peaking at 6.5 metres on 28 November 2022. A smaller event in July 2022 reached the moderate flood warning level, where the river height reached 5 metres on 11 July 2022.

Figure 13: Daily river height at Tamworth<sup>6</sup>



<sup>5</sup> Heights are referenced to a local datum. The cease to flow level at this gauging site is -0.63 metres using the local datum.

<sup>6</sup> Flood severity intervals obtained from the Australian Bureau of Meteorology

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## Surface water resources and management

### Legislation

The Peel Regulated River Water Source was managed under the conditions set out in the *Water Sharing Plan for the Peel Regulated River Water Source 2010*<sup>7</sup>, for the entirety of 2022–23. A replacement plan has since been gazetted commencing 1 July 2022.

### Access rights

Share component remained unchanged for all categories, except for General Security, which decreased due to trade to the Lower Namoi during the reporting period. As of 30 June 2023, a total of 46,416 shares were on issue across 7 categories of access licence (Table 2). Historical share component by category (under water sharing plan management) is presented in Figure 14.

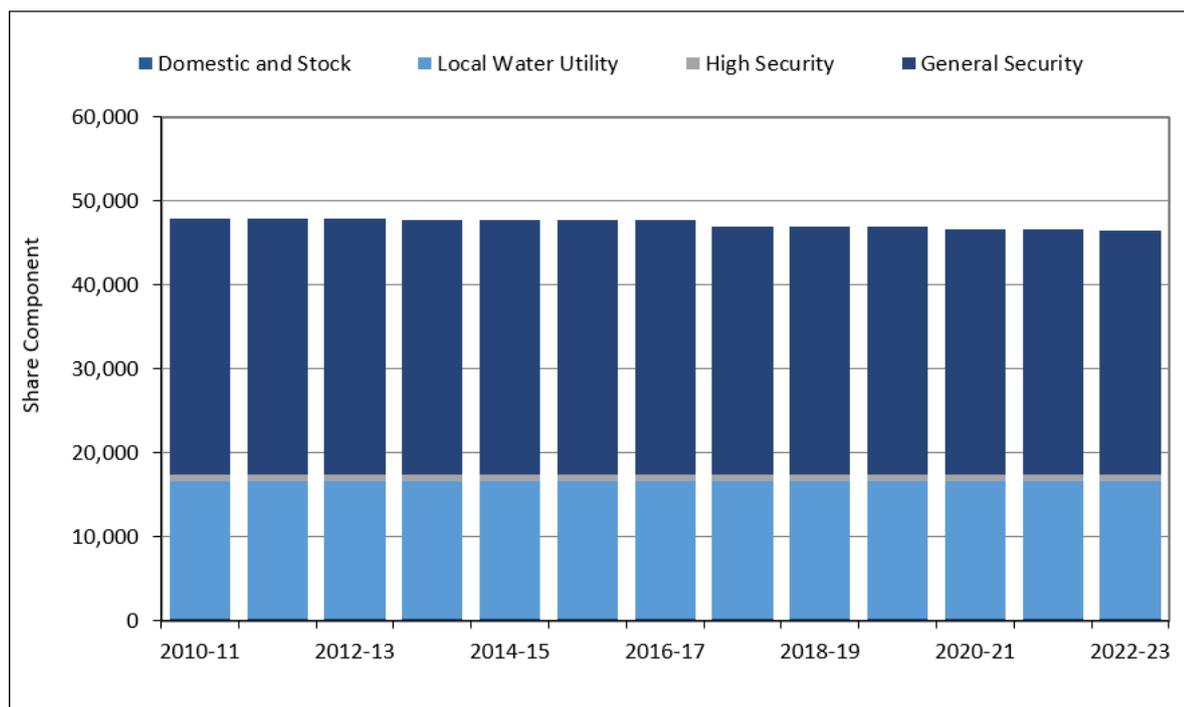
Table 2: Issued share component

Licence category	Share component 30 June 2023	Share component 30 June 2022	Number of licences 30 June 2023
Domestic and Stock	77	77	11
Domestic and Stock [Domestic]	66	66	4
Domestic and Stock [Stock]	20	20	4
Local Water Utility	16,400	16,400	1
Regulated River (General Security)	29,049	29,311	178
Regulated River (High Security)	801	801	12
Regulated River (High Security) [Research]	3	3	1
<b>Total</b>	<b>46,416</b>	<b>46,678</b>	<b>211</b>

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<sup>7</sup> The water sharing plan was amended commencing 1 July 2020 to remove groundwater and unregulated water sources (and assign to an alternative water sharing plan).

Figure 14: Peel regulated river share component since the introduction of the water sharing plan



## Access licence account management

Table 3 summarises the licence allocation accounting rules in place for the reporting period. The Peel adopts an annual accounting approach for allocation of resources. No carryover provisions are available, and all categories of access licence are limited to a maximum allocation of 100% or one megalitre per share. General-security licence holders may have access to uncontrolled flow events in years below optimum allocations to supplement regulated supply, subject to operational announcements by WaterNSW.

Table 3: Water allocation licence accounting rules for the reporting period

Licence category	Carryover limit	AWD upper limit for uncontrolled flow access	AWD plus uncontrolled flow usage limit	AWD limit
<b>Domestic and Stock<sup>8</sup></b>	0%	N/A	N/A	100%
<b>General Security</b>	0 ML per share	1 ML per share	1 ML per share	1 ML per share

<sup>8</sup> may be limited to 70% to meet requirements of clause 50(1) of the WSP

Licence category	Carryover limit	AWD upper limit for uncontrolled flow access	AWD plus uncontrolled flow usage limit	AWD limit
High Security <sup>9</sup>	0 ML per share	N/A	N/A	1 ML per share
High Security <sup>9</sup> (Research)	0 ML per share	N/A	N/A	1 ML per share
Local Water Utility <sup>8</sup>	0%	N/A	N/A	100%

### Access licence accounting summary

A summary of access licence transactions at licence category level for the period 1 July 2022 to 30 June 2023 is provided in Table 4. A summary subset for held environmental licences only, and consumptive licences only is provided in Table 5 and Table 6 respectively. Detailed descriptions and further information of these processes is available in Note 1 and Note 5 of this GPWAR. Table 12 provides a description of each column in the tables.

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<sup>9</sup> may be limited to 0.5 ML per unit share to operational rules (Part 6) and basic landholder rights

Table 4 : Allocation account balance summary for the Peel Regulated River – all licences<sup>10</sup>. See Table 12 for column header descriptions.

Category	Share 30 June 2023	Opening Balance	AWD	Lic New	Lic Can	Drought sus In	Drought sus Out	Asn In	Asn Out	Usage Control	Usage Uncont <sup>11</sup>	During Year Forfeit	EoY Avail	EoY NA	EoY Forfeit	Carry Fwd
Domestic and Stock	77	0	77	0	0	0	0	0	0	14	0	0	63	0	63	0
Domestic and Stock [Domestic]	66	0	66	0	0	0	0	0	0	30	0	0	37	0	37	0
Domestic and Stock [Stock]	20	0	20	0	0	0	0	0	0	0	0	0	20	0	20	0
Local Water Utility	16,400	0	16,400	0	0	0	0	0	0	7,554	0	0	8,846	0	8,846	0
General Security	29,049	(32)	29,311	0	87	0	0	450	450	2,547	0	0	26,646	0	26,646	0
High Security	801	0	801	0	0	0	0	0	0	84	0	0	717	0	717	0
High Security (Research)	3	0	3	0	0	0	0	0	0	0	0	0	3	0	3	0

Table 5 : Allocation account balance summary for the Peel Regulated River – held environmental only. See Table 12 for column header descriptions.

Category	Share 30 June 2023	Opening Balance	AWD	Lic New	Lic Can	Drought sus In	Drought sus Out	Asn In	Asn Out	Usage Control	Usage Uncont	During Year Forfeits	EoY Avail	EoY NA	EoY Forfeit	Carry Fwd
General Security	1,257	0	1,257	0	0	0	0	0	0	0	0	0	1,257	0	1,257	0

<sup>10</sup> ( ) denotes a negative value. Figures are in megalitres, except for share component, which is the total number of issued shares for the relevant licence category.

<sup>11</sup> Uncontrolled flow may be available for general-security licence holders for defined events. See note 17 for more details

Table 6 : Allocation account balance summary for the Peel Regulated River – consumptive licences only<sup>12</sup>. See Table 12 for column header descriptions.

Category	Share 30 June 2023	Opening Balance	AWD	Lic New	Lic Can	Drought sus In	Drought sus Out	Asn In	Asn Out	Usage Control	Usage Uncont	During Year Forfeits	EoY Avail	EoY NA	EoY Forfeit	Carry Fwd
Domestic and Stock	77	0	77	0	0	0	0	0	0	14	0	0	63	0	63	0
Domestic and Stock [Domestic]	66	0	66	0	0	0	0	0	0	30	0	0	37	0	37	0
Domestic and Stock [Stock]	20	0	20	0	0	0	0	0	0	0	0	0	20	0	20	0
Local Water Utility	16,400	0	16,400	0	0	0	0	0	0	7,554	0	0	8,846	0	8,846	0
General Security	27,792	(32)	28,054	0	87	0	0	450	450	2,547	0	0	25,389	0	25,389	0
High Security	801	0	801	0	0	0	0	0	0	84	0	0	717	0	717	0
High Security (Research)	3	0	3	0	0	0	0	0	0	0	0	0	3	0	3	0

<sup>12</sup> The consumptive account balance summary is produced as the difference between the total access licence balance and the held environmental water access licence balance.

## Extreme events stage and temporary water restrictions

The NSW Extreme Events Policy was released in October 2018 and updated in August 2023 to include drought measures with drought stages. The policy provides a framework for managing extreme events in the major river systems of the NSW Murray–Darling Basin. This framework is based on a staged approach, providing a range of measures for water managers to implement as conditions deteriorate.

Temporary water restrictions are an example of the type of measures that can be implemented to manage a water shortage. These restrictions are issued under section 324 of the *Water Management Act 2000* and have been implemented in several river valleys in the current drought to preserve water for critical needs.

Table 7 outlines the conditions that may be associated with different stages of criticality for surface water quantity. Further information is available at [NSW Extreme events policy](#)

Table 7: Determination of stages of criticality for surface water quantity

Stage	Stage description	Stage evidence base
1	Normal management	Can deliver all account water under normal river operations practices.
2	Emerging drought	Unable to deliver 100% of high priority account water and maximum expected use of General Security under normal river operations practices.
3	Severe drought	Only able to deliver restricted high priority demands and restricted remaining General Security account water.
4	Critical drought	Only able to deliver restricted town water supply, stock and domestic and other restricted high priority demands.

## Temporary water restrictions and drought measures

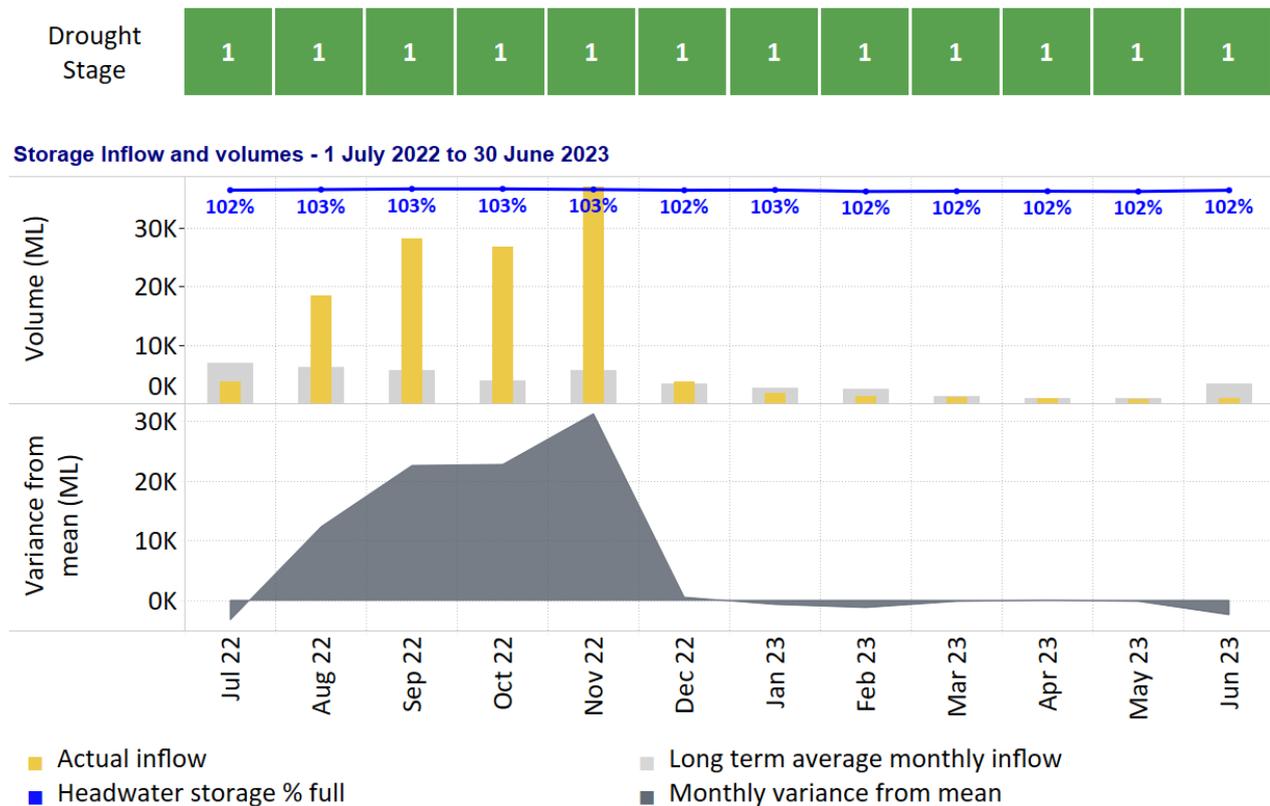
Not applicable (no temporary water restrictions were enacted during the reporting period)

## Extreme events stage

- The Peel River valley was in stage 1 (normal drought) conditions at the commencement of the reporting period and remained in stage 1 throughout the entirety of the 2022–23 water year Figure 15.

Chaffey Dam storage was over 100% capacity for much of the reporting period. Several inflow events occurred further increasing the capacity of Chaffey Dam to a maximum of 109% on 1 November 2022.

Figure 15: Drought stage for the reporting period referenced with monthly headwater storage inflows, monthly storage inflow variance from mean and 2-year cumulative inflow sequence



## Water availability

- Stage 1 (normal drought) conditions leading into the reporting period corresponded to optimal opening allocations for all categories.
- Domestic and stock (including all sub-categories) and local water utility received an opening AWD of 100% (the maximum allowable under the water sharing plan rules for these categories).
- High Security (and High Security—Research), received an opening AWD of 1 megalitre per share (the maximum allowable under the water sharing plan rules for these categories).
- General Security received an opening AWD of 1 megalitres per share.
- This was the second consecutive year of high overall water availability (Figure 19), with all categories receiving the maximum allowable under the water sharing plan rules for the year.
- Historical monthly available water determinations under water sharing plan management conditions are presented for general-security, high-security and Local Water Utility access licences in Figure 16, Figure 17 and Figure 18 respectively.

Figure 16: General Security progressive (monthly) available water determinations

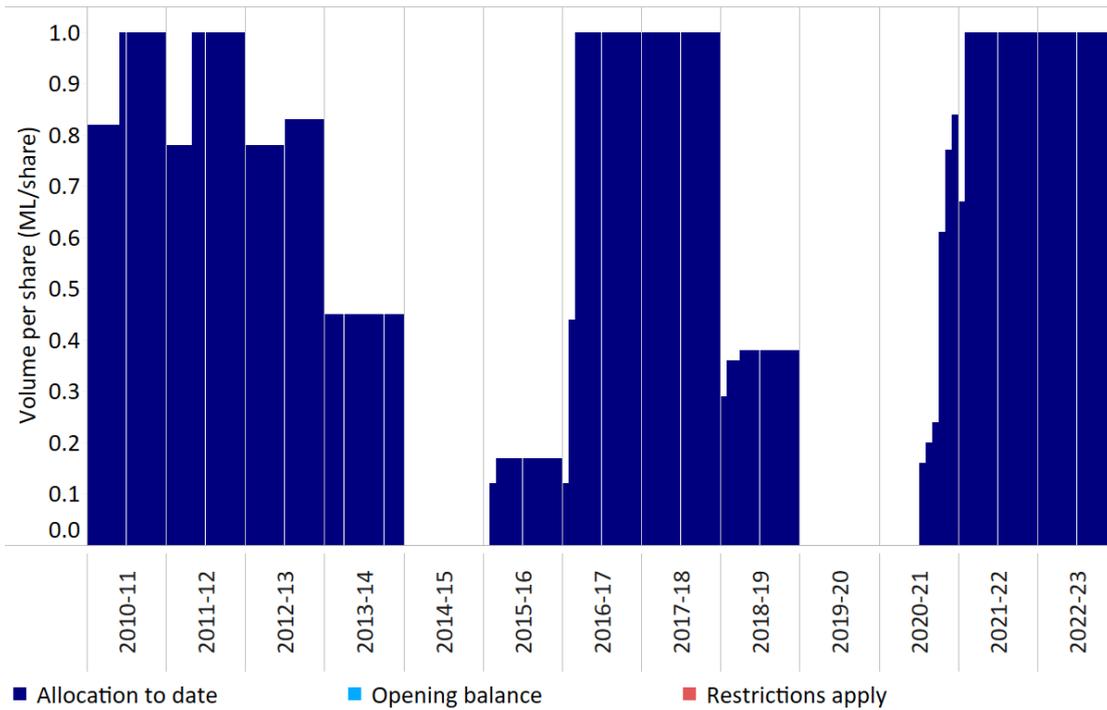


Figure 17: High Security progressive (monthly) available water determinations

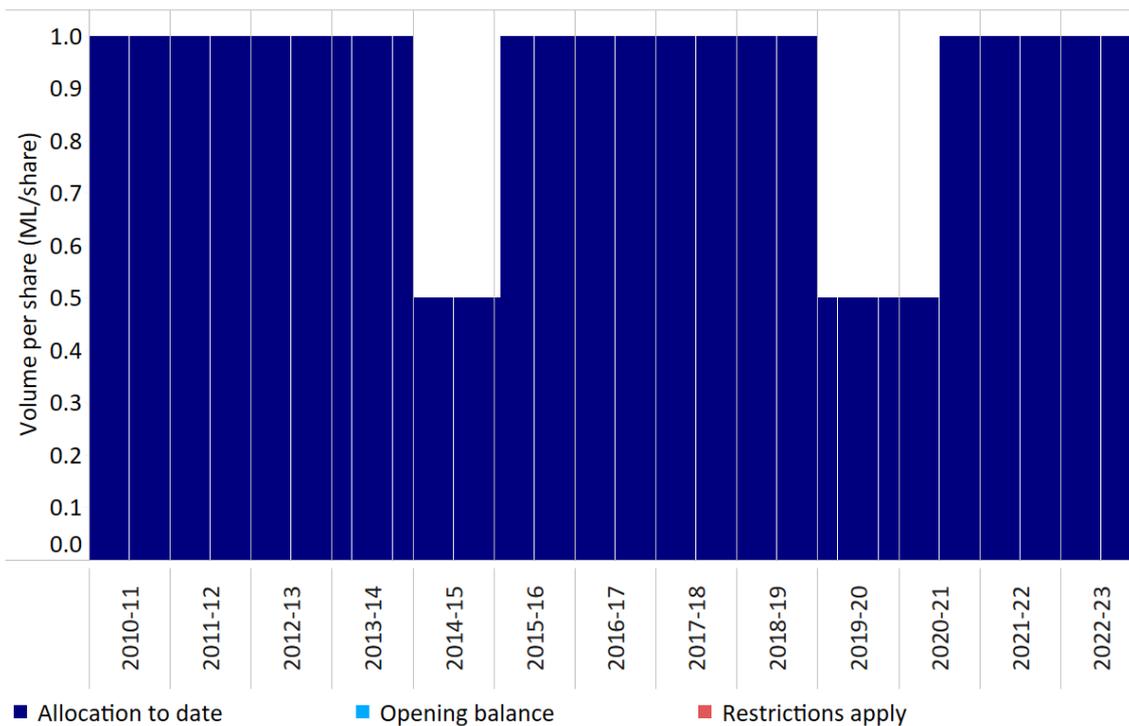


Figure 18: Local Water Utility progressive (monthly) available water determinations

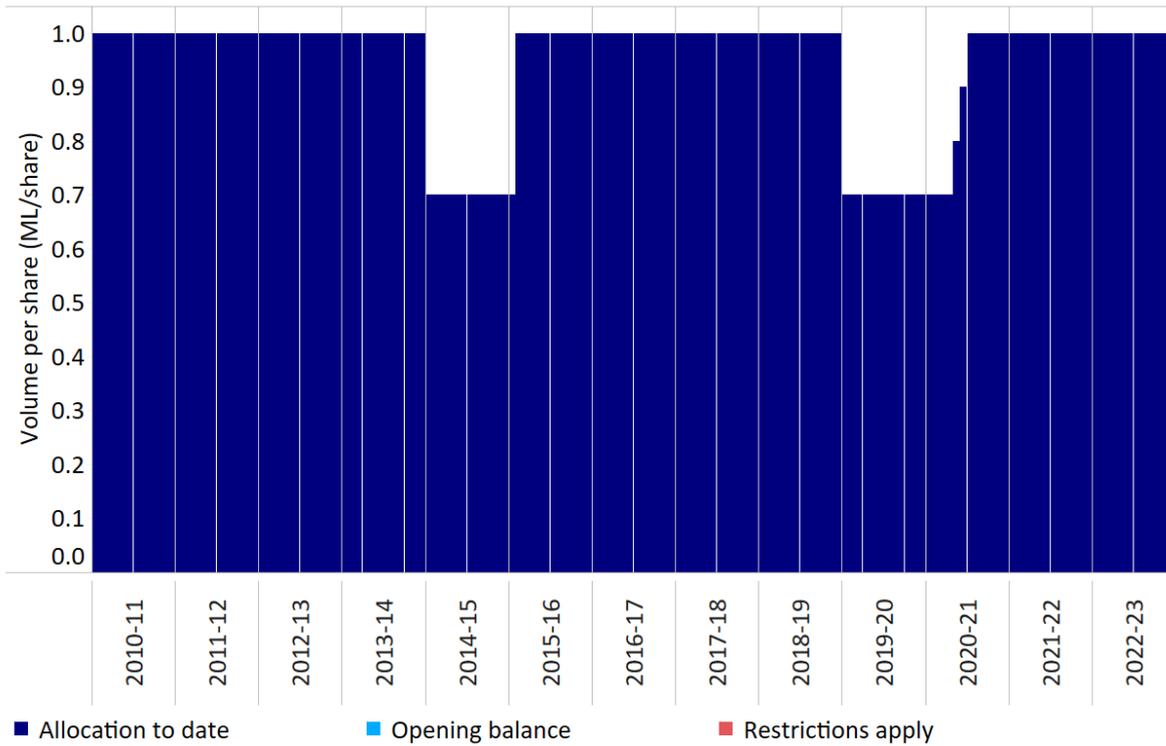
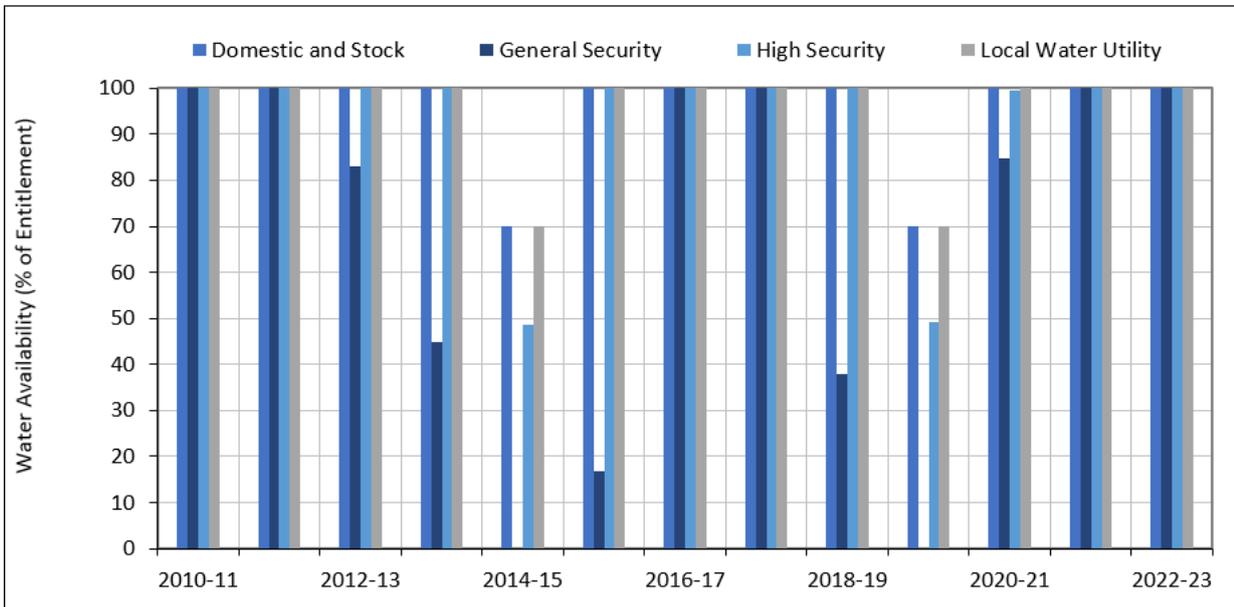


Figure 19: Peel water availability (available water determinations as a percentage of share)<sup>13</sup>



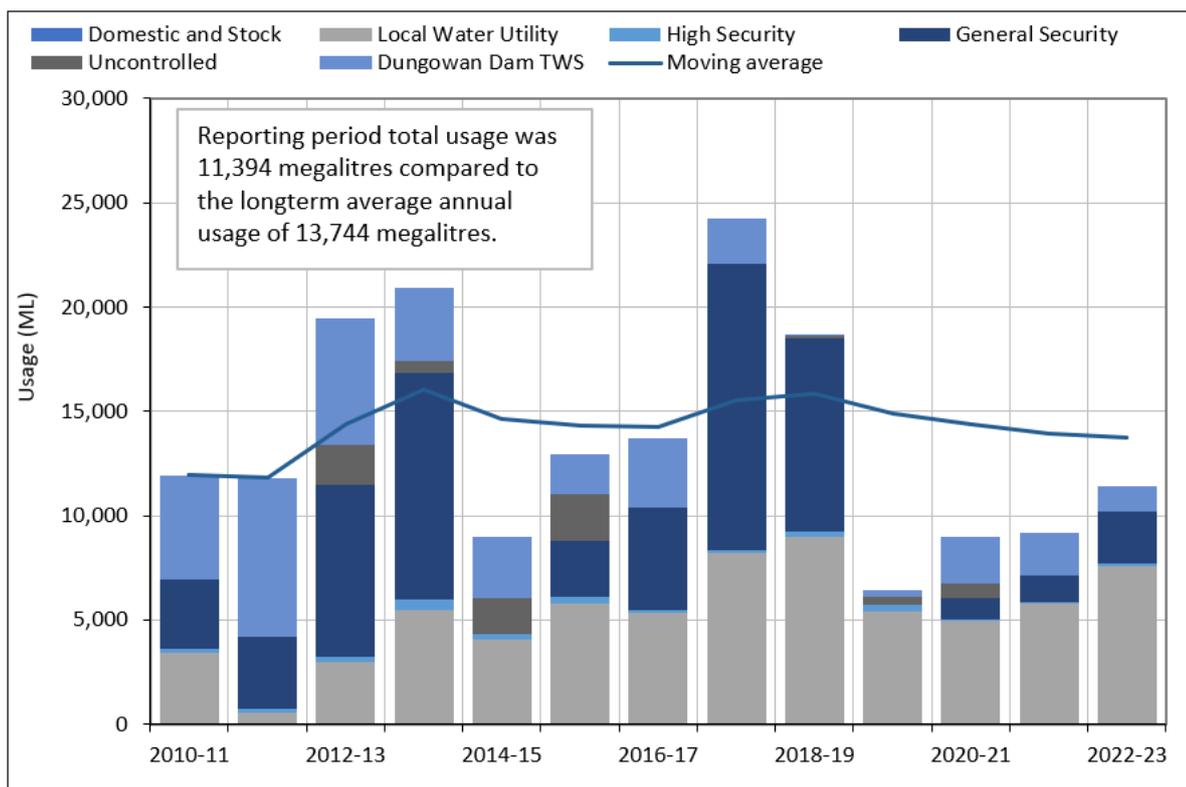
<sup>13</sup> Carryover is zero for all categories of access licence (i.e. carryover of unused account water is not permitted)

## Account usage

Account usage refers to the total volume of water debited against an access licence account. Extractions that do not debit the account (uncontrolled flow provisions) may be available and additional to account usage.

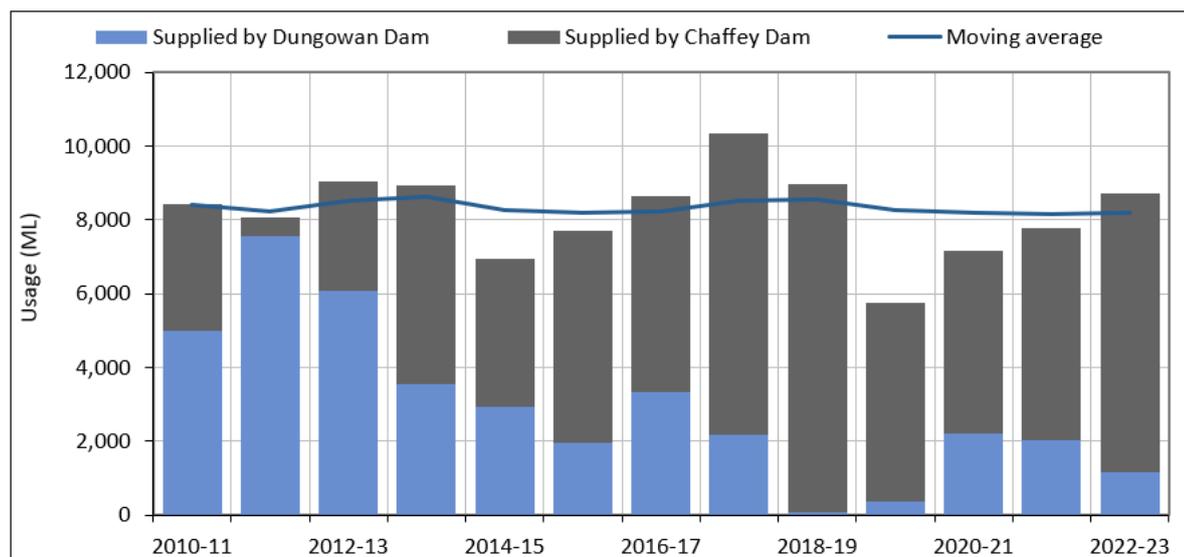
- Account usage supplied by Chaffey Dam totalled 10,228 megalitres, an increase on the volume supplied in the prior reporting period (7,136) (Figure 20).
- Tamworth (town water supply) utilised a total of 1,166 megalitres from Dungowan Dam<sup>14</sup> (down from 2,032 in the prior period) and 7,554 megalitres from Chaffey Dam, a total demand of 8,720 megalitres (Table 18). The average annual usage for Tamworth is 8,189 megalitres.
- Average annual usage under water sharing plan management conditions (all categories of licence, including uncontrolled flow access and Dungowan Dam extractions for Tamworth) was 13,744 megalitres.
- Average annual usage considering only the Peel regulated river water source (excludes Dungowan extractions for the unregulated Peel) is 10,788 megalitres.

Figure 20: Total usage (including Dungowan and Uncontrolled Flow) since the start of the water sharing plan



<sup>14</sup> Dungowan Dam is operated by Tamworth Regional Council. The storage and extraction right for Dungowan Dam is licenced within the Upper Peel River Tributaries Water Source (unregulated).

Figure 21: Tamworth total usage



## Utilisation and inactive share

We consider an access licence entitlement to be inactive if the holding does not use water or access the temporary trade market for the reporting period. Utilisation reflects the amount of water used from regulated supplies (excludes supplementary water), relative to the maximum amount available for use.

- 55% of general-security share component was inactive for the reporting period, decreasing from 65% in the previous reporting period (Table 8)
- Considering all categories of access licences, 7% of share component was inactive, decreasing from 43% in the previous reporting period.
- Utilisation of available water from regulated supplies (i.e. excluding local water utility and uncontrolled flow access), increased to 9% from 5% (Figure 22) in the reporting period.
- Utilisation of local water utility in the Peel regulated river water source also increased to 46% from 35% (Figure 23)<sup>15</sup>

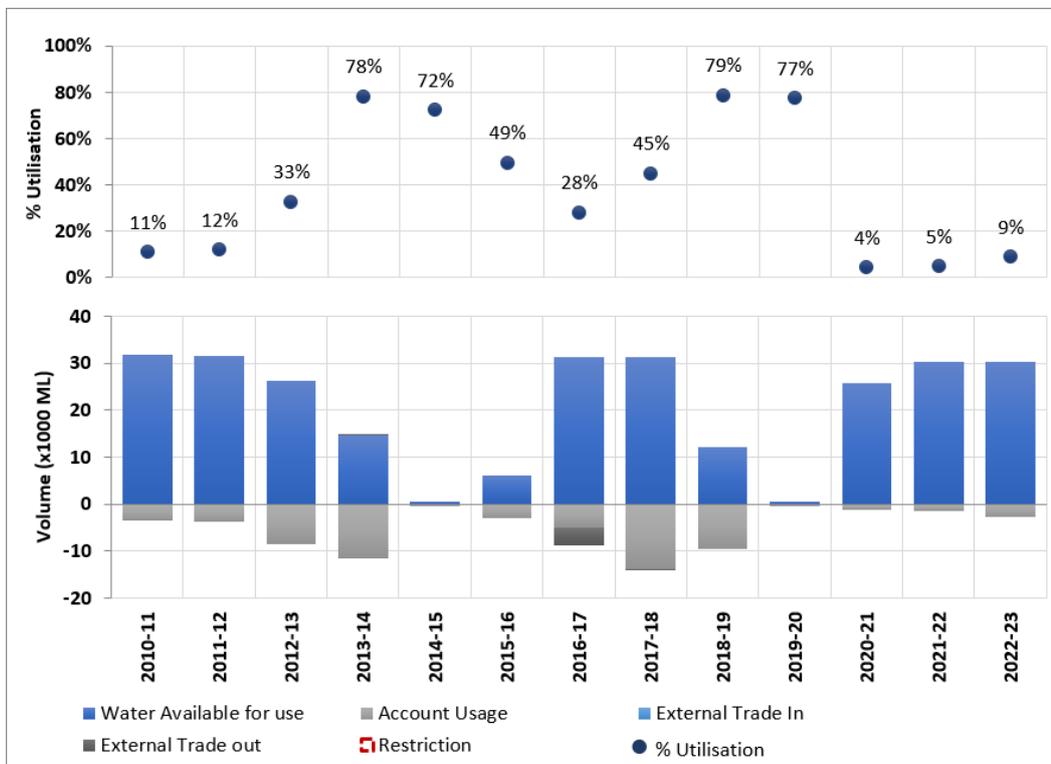
Licence category	Inactive licences (number)	Inactive share component	Inactive share % of total	Inactive share % of total prior year (2021–22)
<b>Domestic and Stock</b>	8	59	77%	91%
<b>Domestic and Stock [Domestic]</b>	2	5	8%	9%
<b>Domestic and Stock [Stock]</b>	4	20	100%	100%
<b>Local Water Utility</b>	0	0	0%	0%
<b>Regulated River (General Security)</b>	127	15,892	55%	65%

<sup>15</sup> Excludes water sourced from Dungowan Dam (unregulated access licences).

Licence category	Inactive licences (number)	Inactive share component	Inactive share % of total	Inactive share % of total prior year (2021–22)
Regulated River (High Security)	8	604	75%	85%
Regulated River (High Security) [Research]	1	3	100%	100%
<b>Total regulated supply</b>	<b>150</b>	<b>16,583</b>	<b>36%</b>	<b>43%</b>

Table 8: 2022–23 inactive licence summary

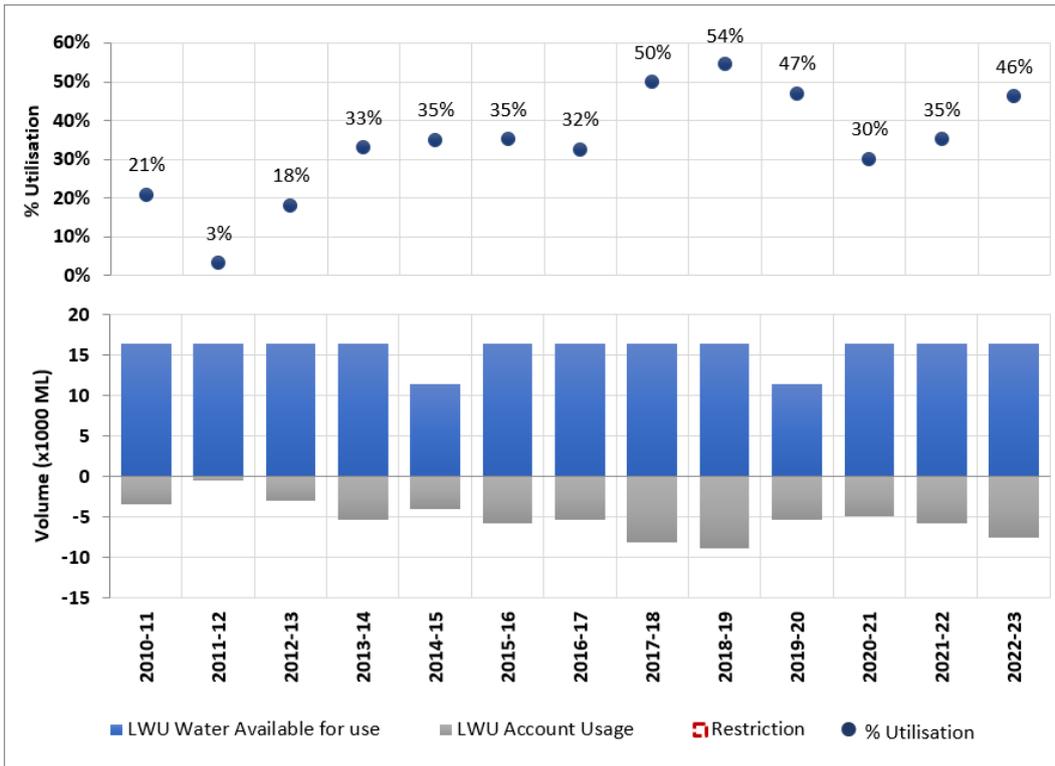
Figure 22: Percentage utilisation (water availability against account usage and trade out to the lower Namoi<sup>16</sup>, excluding Local Water Utility and access to uncontrolled flow)<sup>17</sup>



<sup>16</sup> Historically, trades to the Lower Namoi have been permitted; however, under Clause 45(b) of the Water Sharing Plan for the Peel Regulated River Water Source 2022, water trading to or from another water source to the Lower Namoi is no longer allowed to ensure equitable distribution and sustainable use.

<sup>17</sup> Total water availability is presented as carryover plus AWD. Temporary use restrictions due to drought conditions may apply.

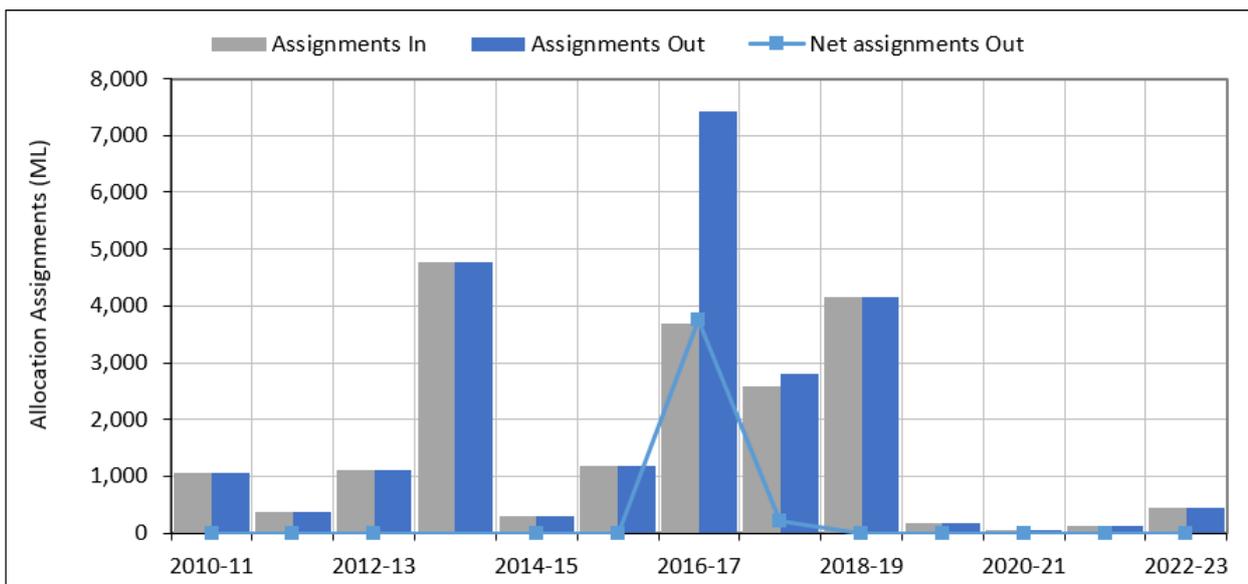
Figure 23: Percentage utilisation local water utility only<sup>15</sup>



### Allocation assignments (temporary trading)

The total volume traded increased in the reporting period (Figure 24). A total of 450 megalitres was assigned between Peel water access licences. See disclosure Note 4 of this GPWAR for more information about temporary trading.

Figure 24: Allocation assignment totals



## Commercial temporary trading statistics

- A total of 2 transactions were processed for commercial consideration<sup>18</sup> (Figure 26).
- The average price was \$45 per megalitre, a 4% decrease on the prior year (\$47 per megalitre)
- The maximum price paid for water was \$50 per megalitre.
- The total market value was \$6,500, while a 2% decrease on the prior year (\$6,650).

Figure 25: Peel allocation assignments trade market commercial price statistics <sup>19</sup>

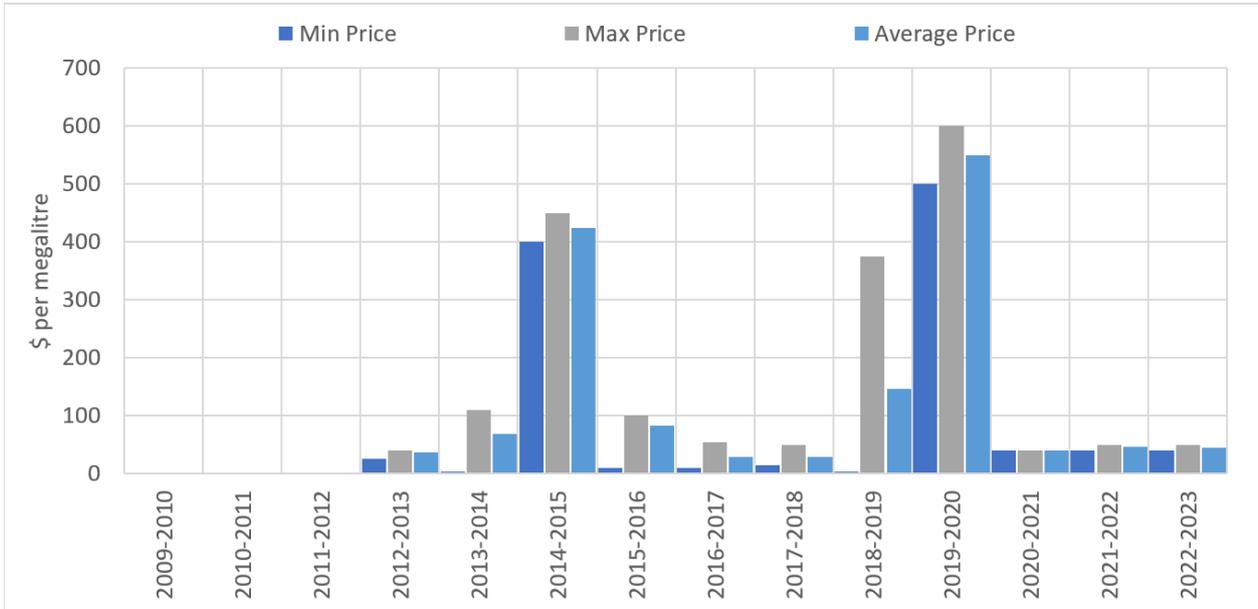
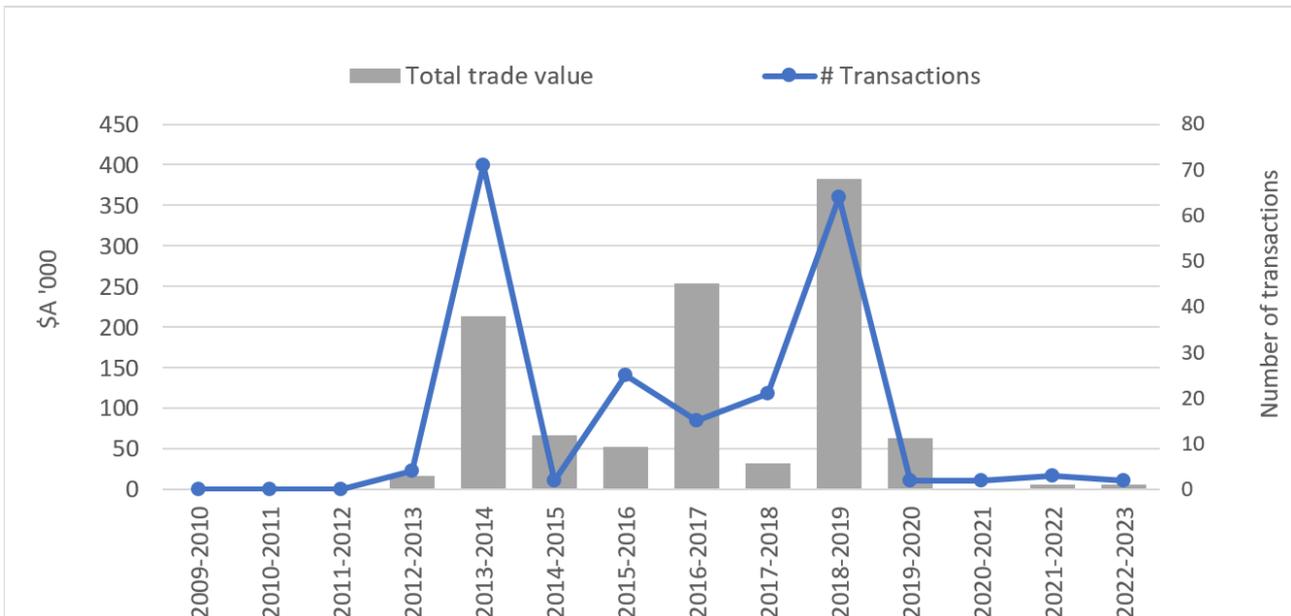


Figure 26: Peel allocation assignments trade market commercial value statistics



<sup>18</sup> Assumed as trades exchanged for a consideration of greater than \$1 per megalitre

<sup>19</sup> Allocation assignments with a purchase price equal to or less than \$1 per megalitre are excluded from the analysis as they are not considered to be a fair reflection of the market. An upper limit of the mean plus 3 standard deviations is also applied.

## Permanent trading

### Commercial permanent trading statistics

A total of 1 permanent assignment of general security shares occurred within the reporting period (Figure 28). The maximum price paid for water was \$1,400 per megalitre.

In addition to share assignments, 7 transfers of licence holder occurred for commercial exchange<sup>20</sup>, resulting in 1,414 shares moving to a new holder (Figure 29).

Figure 27: Peel share assignments trade market commercial price statistics—General Security<sup>21</sup>

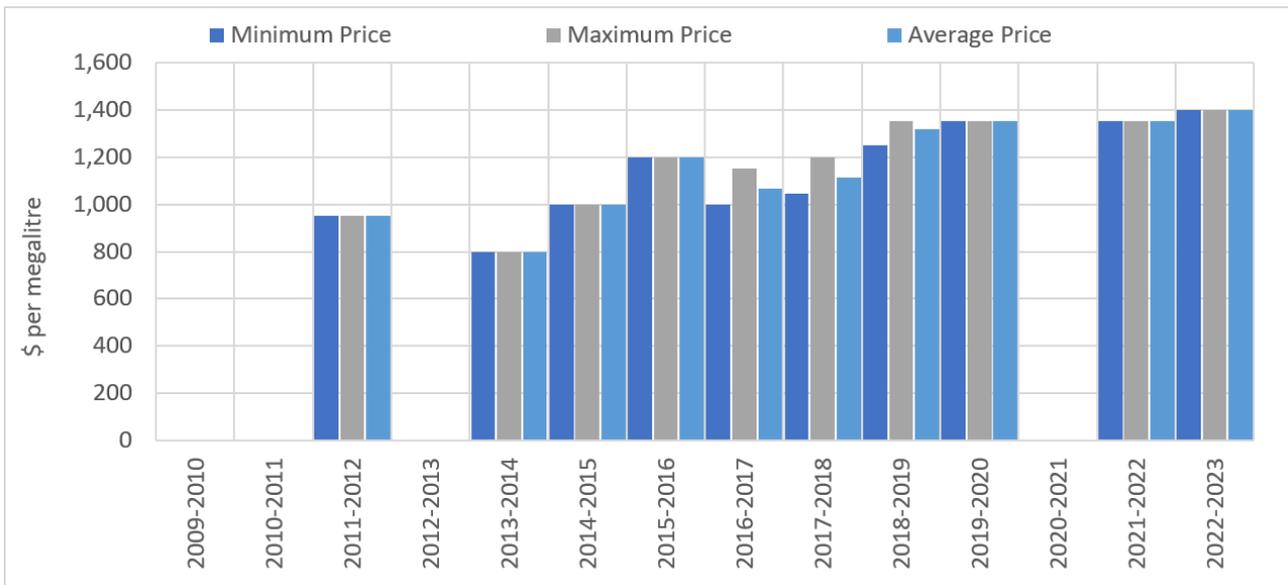


Figure 28: Peel share assignments trade market commercial value statistics—General Security

<sup>20</sup> Licence holder transfers with a total consideration less than or equal to \$1 are excluded from analysis. Price information for change of licence holder is commonly associated with coupled licence categories therefore is not considered in this report.

<sup>21</sup> Share assignments with a purchase price less than or equal to \$1 per share are excluded from the analysis as they are not considered to be a fair reflection of the market.

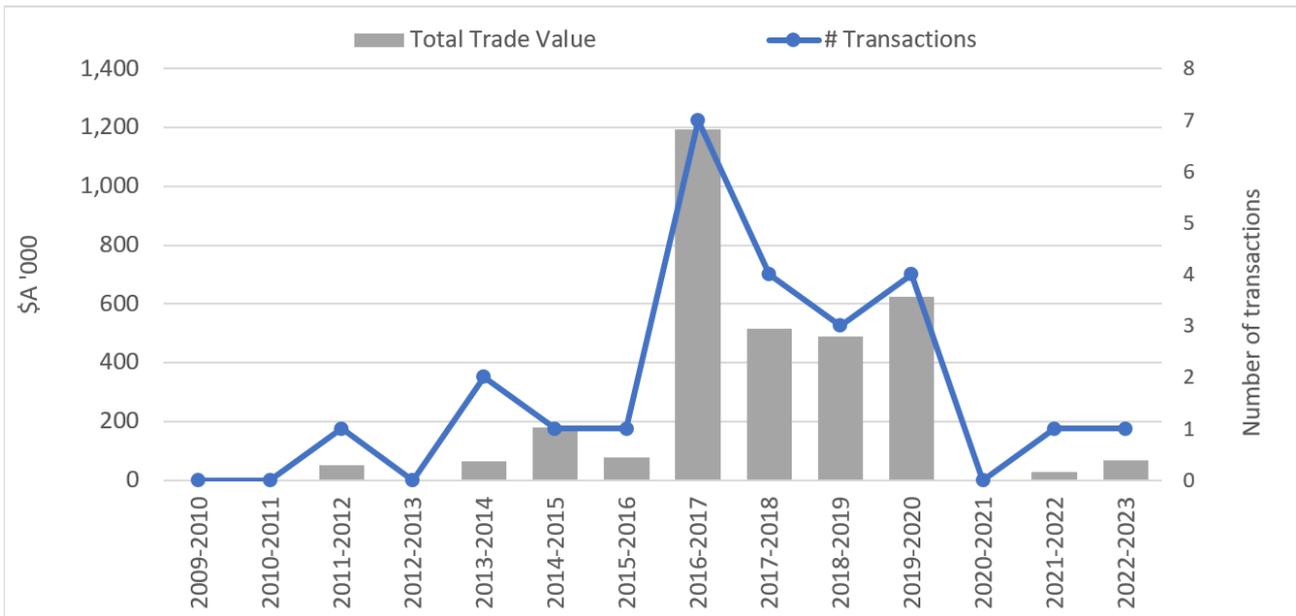
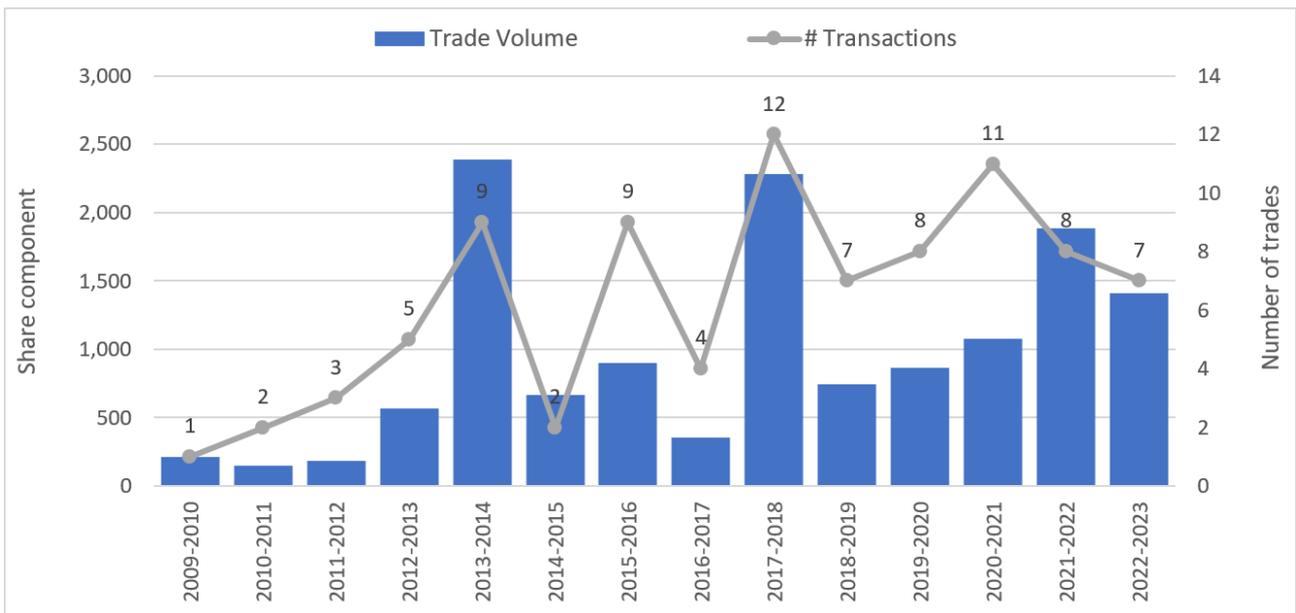


Figure 29: Peel transfer of licence holder



# Environmental water

## Held environmental water

There was no change to the environmental holding in 2022-23 (Figure 30). 1,257 shares of General Security are held and managed for environmental outcomes in the Peel. In 2022-23, zero megalitres of held environmental water was used in the reporting period (Figure 31).

Figure 30: Held environmental water share component

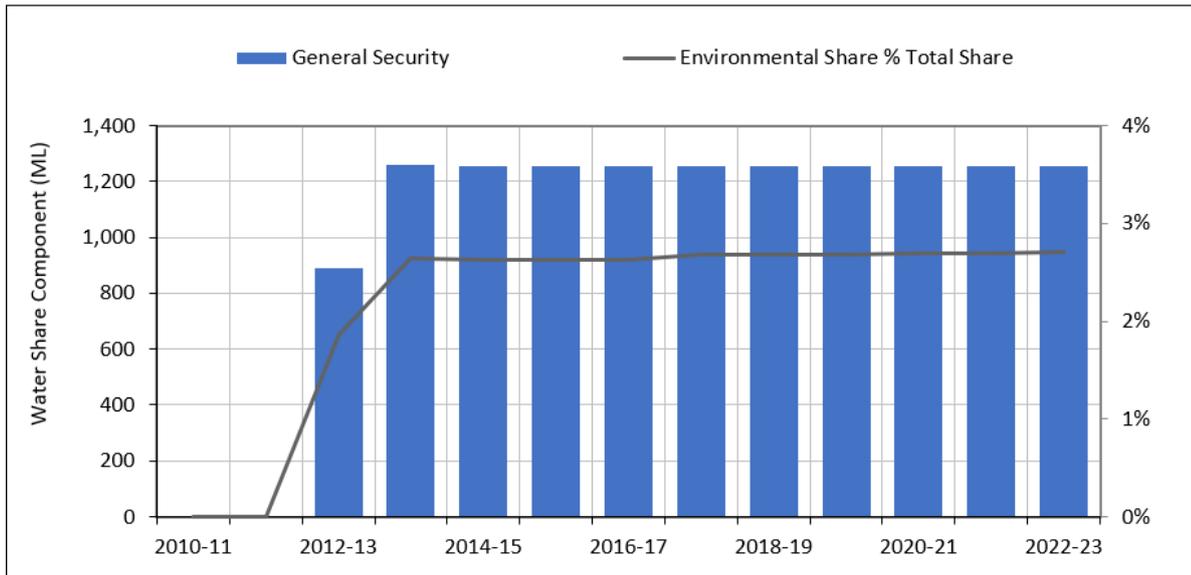
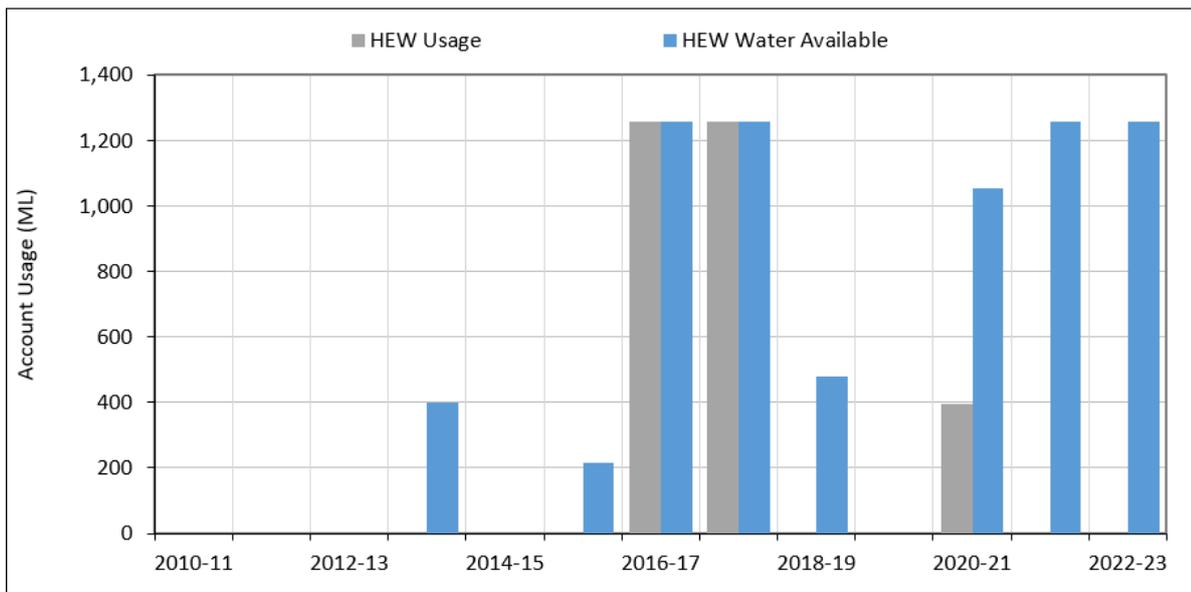


Figure 31: Held environmental water availability and usage



## Planned environmental water

### Environmental contingency allowance

With the augmentation of Chaffey Dam now completed (100,500 megalitres), the stimulus flow release stipulated in the water sharing plan prior to 2016–17 was replaced by an environmental contingency allowance (ECA) of up to 5,000 megalitres. This is discretionally managed to mimic the natural flow variability in the upper reaches of the Peel River (see disclosure Note 6 for more details).

In 2022–23, a total of zero megalitres of ECA was released. An annual summary of the ECA is presented in Table 9.

Table 9: Environmental contingency allowance annual summary

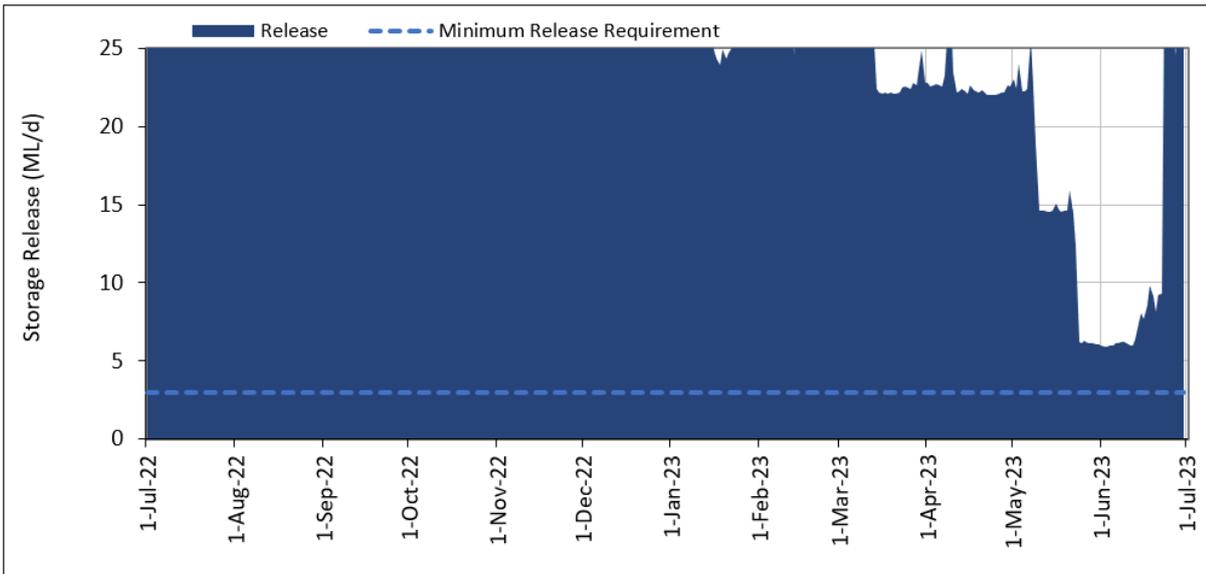
Water Year	Opening	Credit	Usage	Forfeiture	Carry forward
2016-17	0	5,000	4,933	67	0
2017-18	0	5,000	2,662	2,338	0
2018-19	0	1,900	0	1,900	0
2019-20	0	0	0	0	0
2020-21	0	4,200	1,170	3,030	0
2021-22	0	5,000	0	5,000	0
2022-23	0	5,000	0	5,000	0

### Minimum flow requirements

In line with the water sharing plan requirements, a minimum daily release of 3 megalitres per day is required from Chaffey Dam<sup>22</sup>. The requirement was met for the entirety of the reporting period (Figure 32).

<sup>22</sup> Except where a release of greater than 3 megalitres per day is required to meet basic landholder rights and access licence extractions, or there is a release from the environmental contingency allowance.

Figure 32 : Chaffey dam releases and minimum release requirements



# Water accounting statements

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## Significant water accounting policies

We have used an accrual basis of accounting to prepare the water accounting statements in this GPWAR. All figures are in megalitres (ML).

We have excluded the 'Statement of Physical Flows' from this GPWAR as all transactions have been presented in the statements 'Water Assets and Liabilities' and 'Changes in Water Assets and Water Liabilities'. We have included a physical flow diagram that represents the physical movements of water to more clearly depict those accounting processes associated with physical flow movement.

For general information on how to interpret the NSW Department of Climate Change, Energy, the Environment and Water water accounting statements refer to the Guide to General Purpose Water Accounting Reports available for download on from the NSW Department of Climate Change, Energy, the Environment and Water website ([www.industry.nsw.gov.au/water](http://www.industry.nsw.gov.au/water)).

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## Quantification of data

### Data accuracy

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 we anticipate high accuracy through to modelled results and estimates where accuracy can be highly variable, depending on a range of factors. To improve accuracy and prevent misuse of the data in the accounts, we have added an accuracy assessment (Table 10) to all figures in the water accounting statements.

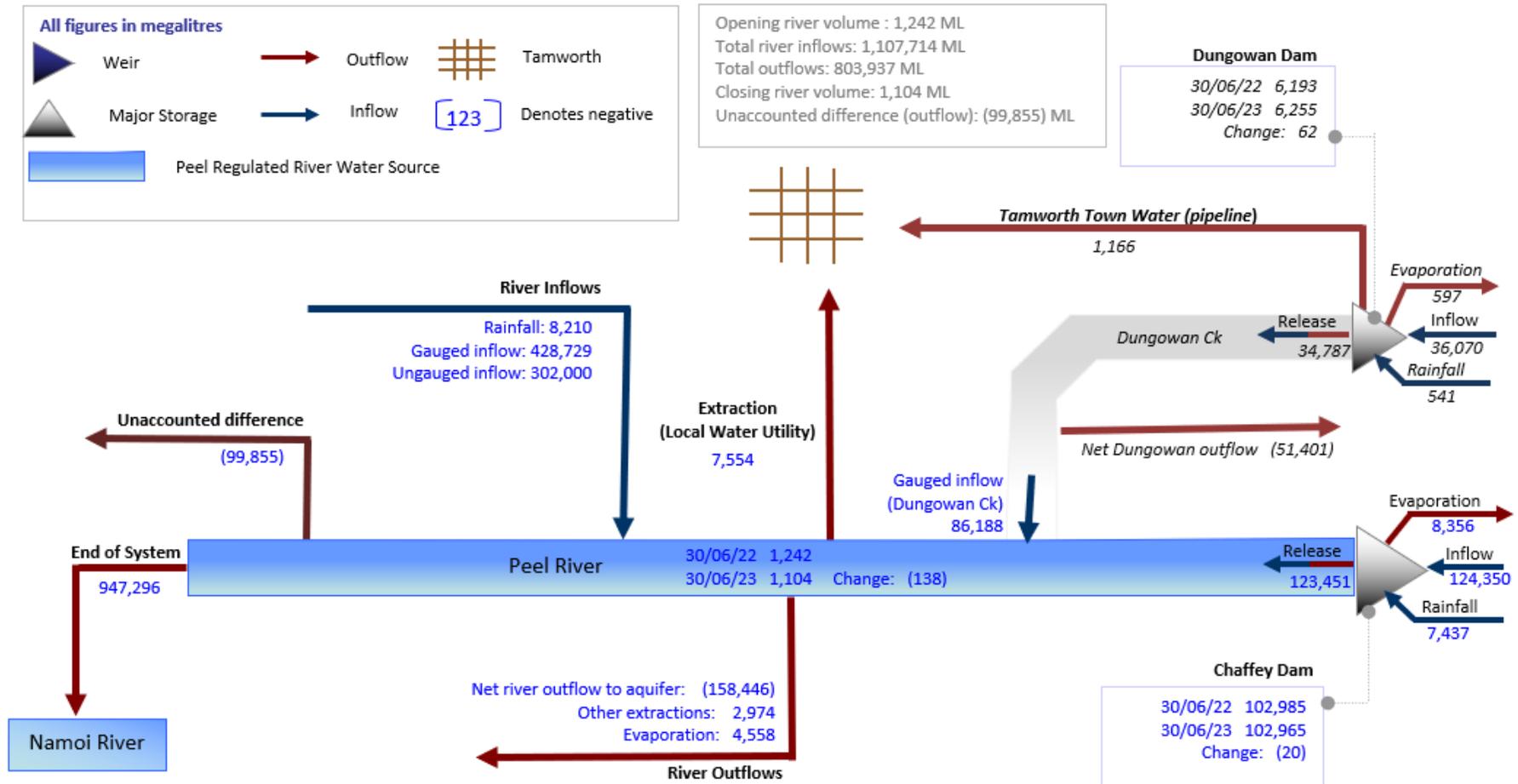
Table 10: Water account data accuracy estimates key

Accuracy	Description
A1 <sup>23</sup>	+/- 0% Data is determined rather than estimated or measured. Therefore, the number contains no inaccuracies.
A	+/- 10%
B	+/- 25%
C	+/- 50%
D	+/- 100%

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<sup>23</sup> Non-physical administration items, such as available water determinations, trading and carryover volumes, are assumed to have no inherent error for the purposes of this report. Items are reported as extracted from the NSW Department of Climate Change, Energy, the Environment and Water corporate database.

## 2022–23 Physical flows mass balance diagram



1. A negative unaccounted difference indicates more system inflow is required to achieve balance on the river

## Statement of water assets and liabilities<sup>24</sup>

For the year ended 30 June 2023

In all tables (..) denotes a negative value.

### Surface water assets

1.Surface Water Storage	Accuracy	Notes	30-06-2023	30-06-2022
Chaffey Dam	A		102,965	102,985
Dungowan Dam	A		6,255	6,193
Peel River	A		124,258	1,182
<b>Total Surface Water Storage(Asws)</b>			<b>233,478</b>	110,360
<i>Change in Surface Water Storage</i>			<i>123,117</i>	<i>15,283</i>

### Surface water liabilities

2.Allocation account balances	Accuracy	Notes	30-06-2023	30-06-2022
General security	A		0	(32)
High Security	A		0	0
<b>Total allocation account balances(Asws)</b>			<b>0</b>	(31)
<i>Change in allocation accounts</i>			<i>32</i>	<i>(32)</i>

3.Environmental contingency allowance	Accuracy	Notes	30-06-2023	30-06-2022
Environmental Contingency Allowance	A1	6	0	0
<b>Total ECA balances(Asws)</b>			<b>0</b>	0
<i>Change in planned environmental water balances</i>			<i>0</i>	<i>0</i>

### Surface water net changes

4.SURFACE WATER NET ASSETS	30-06-2023	30-06-2022
Net surface water assets (ASWS-LALOC-LPEW)	233,478	110,392
<i>Change in net surface water assets</i>	<i>123,086</i>	<i>15,315</i>

<sup>24</sup> Minor variations in the comparative year relative to previous GPWAR publications may occur due to updates in information or estimation methods. Variations of significant magnitude are captured as

# Statement of changes in water assets and liabilities

For the year ended 30 June 2023

## 1. Changes in surface water storage (physical water balance)

Surface Water Storage Inflows	Accuracy	Notes	30-06-2023	30-06-2022
<b>Chaffey Dam</b>				
Inflow	A	9	124,350	122,842
Rainfall	B	10	7,437	7,183
<b>Dungowan Dam</b>				
Inflow	A	9	36,070	39,621
Rainfall	B	10	541	611
<b>Dungowan Creek (Unregulated WSP)</b>				
Net tributary inflow	A		86,188	
<b>Peel River</b>				
Inflow (gauged)	A	12	428,729	228,671
Inflow (ungauged estimate)	C	13	302,000	306,000
Inflow from storage releases	A	14	123,451	140,562
Rainfall on water storage	C	11	8,210	4,544
Adjusting increases to water assets	A			
<b>Total Surface Water Storage Increases (Isws)</b>			<b>1,116,976</b>	<b>850,035</b>

Surface Water Storage Outflows	Accuracy	Notes	30-06-2023	30-06-2022
<b>Chaffey Dam</b>				
Evaporation	B	10	8,356	7,623
Storage release	A	14	123,451	102,794
<b>Dungowan Dam</b>				
Evaporation	B	10	597	540
Storage release (pipe)	A	21	1,166	2,032
Storage release (valve/spill)	A	14	34,787	37,769
<b>Dungowan Creek (Unregulated WSP)</b>				
Flow leaving river (outflow to Peel River)	A		120,974	NA
<b>Peel River</b>				
Evaporation	C	11	4,558	3,793
Flow leaving river	A	15	947,296	702,984
Net river loss to groundwater	D	19	(158,000)	NA
River extractions (basic rights)	C	18	300	300
Extractions (other)	A	16	10,228	7,136

Surface Water Storage Outflows	Accuracy	Notes	30-06-2023	30-06-2022
Unaccounted difference	D	20	(99,855)	(30,218)
Adjusting decreases to water assets	A			
<b>Total Surface Water Storage Decreases (Dsws)</b>			<b>993,858</b>	834,752
<b>Net Surface Water Storage Inflow (Isws-Dsws-Usws)</b>			<b>123,117</b>	15,283

## 2. Changes in allocation accounts

Allocation Account Increases	Accuracy	Notes	30-06-2023	30-06-2022
<b>Available water determination</b>				
Domestic and Stock	A1	1	77	77
Domestic and Stock [Domestic]	A1	1	66	66
Domestic and Stock [Stock]	A1	1	20	20
Local Water Utility	A1	1	16,400	16,400
General Security	A1	1	29,311	29,311
High Security	A1	1	801	801
High Security (Research)	A1	1	3	3
Allocation assignments in (temporary trade)	A	4	450	135
Unregulated extraction provisions (demand)	A1	17	0	0
Adjusting increases to allocation accounts	A			
<b>Total Allocation Account Increases (Iaa)</b>			<b>47,128</b>	46,813

Allocation Account Decreases	Accuracy	Notes	30-06-2023	30-06-2022
<b>Account usage</b>				
Domestic and Stock	A1	3	14	2
Domestic and Stock (Domestic)	A1	3	30	22
Domestic and Stock (Stock)	A1	3	0	0
Local water utility	A1	3	7,554	5,740
General Security	A1	3	2,547	1,267
High Security	A1	3	84	104
High Security (Research)	A1	3	0	0
<b>Account forfeits</b>				
Domestic and Stock	A1	1	63	75
Domestic and Stock (Domestic)	A1	1	37	44
Domestic and Stock (Stock)	A1	1	20	20
Local water utility	A1	1	8,846	10,660
General Security	A1	1	26,733	28,076
High Security	A1	1	717	697

Allocation Account Decreases	Accuracy	Notes	30-06-2023	30-06-2022
High Security (Research)	A1	1	3	3
Allocation assignments out (temporary trade)	A1	4	450	135
Uncontrolled flow provisions (supply)	A1	17	0	0
Adjusting increases to allocation accounts	A			
<b>Total Allocation Account Decreases (Daa)</b>			<b>47,096</b>	46,845
<b>Net Allocation Account Balance Increases (Iaa-Daa)</b>			<b>32</b>	<b>(32)</b>

### 3. Changes in environmental contingency allowance

ECA Account Increases	Accuracy	Notes	30-06-2023	30-06-2022
Account credit (due to General Security AWD)			5,000	5,000
<b>Total ECA Increase (Ieca)</b>			<b>5,000</b>	5,000

ECA Account Decreases	Accuracy	Notes	30-06-2023	30-06-2022
ECA account usage	A1	6	0	0
ECA other decreases and forfeits			5,000	5,000
<b>Total ECA Decrease (Deca)</b>			<b>5,000</b>	5,000
<b>Net Environmental Contingency Allowance increase (Ieca - Deca)</b>	0	0		0

### 4. Overall changes

Change in surface water net assets	30-06-2023	30-06-2022
<b>Change in Net Surface Water Assets (Isws-Dsws-USws-Iaa+Daa-IECA+DECA)</b>	123,086	15,315

# Note disclosures

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## Reconciliation and future prospects

This section contains reconciliation and future prospects for the regulated Peel water source.

Reconciliation of change in net water asset to net change in physical water storage <sup>25</sup>	2022–23 (ML)	2021–22 (ML)
Change in net surface water assets	123,086	15,315
Non-physical adjustments	-	-
Net change in allocation accounts	32	(32)
Net change in physical surface water storage	123,118	15,283

Reconciliation of closing water storage to total surface water assets	30 June 2023 (ML)	30 June 2022 (ML)
Closing water storage	-	-
Surface water storage	233,478	110,360
Other surface water assets	0	(31)
Total surface water assets	233,478	110,392

<sup>25</sup> All figures can be derived from or found directly in the Water Accounting Statements of the General Purpose Water Accounting Report. ( ) denotes negative. All figures are rounded to the nearest megalitre

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

Final datasets for reporting in the GPWAR, including meter readings by field staff were not available in time to produce an informative 12-month forecast for report users.

In lieu of this, the links below give the latest water availability information for the Peel Regulated River Water Source. This includes carryovers and available water determinations at the time of reporting, along with probability information about the Peel system's reliability.

### Latest water availability

You can find the latest information on water availability, including water allocation statements, water allocations summaries and available water determinations, on the NSW Department of Climate Change, Energy, the Environment and Water webpage at [www.industry.nsw.gov.au/water/allocations-availability/allocations](http://www.industry.nsw.gov.au/water/allocations-availability/allocations)

You can also subscribe to receive the latest updates.

### Latest storage volumes

See real-time information on storage volumes for the Peel [at realtimedata.waternsw.com.au](http://realtimedata.waternsw.com.au)

### Significant events since this reporting period

At the time of reporting (December 2023) Chaffey Dam has reached full supply capacity, following a continuation of above average rainfall and flows.

All categories of access licence have reached the maximum allocations allowable under the water sharing plan rules (Table 11).

## Carryovers and available water determinations since this reporting period (2023–24)<sup>26</sup>

Table 11: Carryovers and available water determinations 2023–24 (as of December 2023)

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 (%)
<b>Domestic and Stock</b>											
1-Jul-23	Opening	77	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-23	AWD 100.0%	77	77	77	100.0%	100.0%	77	0	77	100.0%	100.0%
<b>Domestic and Stock [Domestic]</b>											
1-Jul-23	Opening	66	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-23	AWD 100.0%	66	66	66	100.0%	100.0%	66	0	66	100.0%	100.0%
<b>Domestic and Stock [Stock]</b>											
1-Jul-23	Opening	20	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-23	AWD 100.0%	20	20	20	100.0%	100.0%	20	0	20	100.0%	100.0%
<b>Local Water Utility</b>											
1 Jul 23	Opening	16,400	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1 Jul 23	AWD 70.0%	16,400	16,400	16,400	100.0%	100.0%	16,400	0	16,400	100.0%	100.0%
<b>Regulated river (General Security)</b>											
1-Jul-23	Opening	29,049	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-23	AWD 0.43 ML per Share	29,049	29,049	29,049	100.0%	100.0%	29,049	0	29,049	100.0%	100.0%
<b>Regulated River (High Security)</b>											
1-Jul-23	Opening	801	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-23	AWD 1.0 ML per Share	801	801	801	100.0%	100.0%	801	0	801	100.0%	100.0%
<b>Regulated River (High Security) [Research]</b>											
1-Jul-23	Opening	3	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-23	AWD 100.0%	3	3	3	100.0%	100.0%	3	0	3	100.0%	100.0%

<sup>26</sup> Allocation summary for the reporting period is presented in Note 2

# Detailed item notes

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## Note 1—Allocation accounts

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

All remaining water in accounts at the conclusion of the water year is forfeited as carryover is not permitted in this water source. The exception to this is a negative account balance, which indicates that more usage has occurred than has been allocated to the account, and the deficit must be carried forward to the next season. Forfeited water is represented as a decrease in water liability.

The accounting is done by licence category and is therefore inclusive of licences held by environmental holders. However, at the time of reporting, no licences were held for the environment.

### Data type

Derived from measured data

### Policy

- *Water Management Act 2000*
- *Water Sharing Plan for the Peel Regulated River Water Source 2010*
  - *Part 9, Division 1, Accounting for water allocation accounts*

Available on the NSW Department of Climate Change, Energy, the Environment and Water website at [www.industry.nsw.gov.au/water](http://www.industry.nsw.gov.au/water)

### Data accuracy

A1—Nil inaccuracy +/- 0%

### Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

### Data source

- Water Accounting System (jointly owned by WaterNSW and NSW Department of Climate Change, Energy, the Environment and Water)

## Methodology

The volume of water to be forfeited from the allocation account for each licence category is determined once all transactions have been applied. Once an end of year account balance is determined, any remaining water in accounts is forfeited. 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:
  - no carryover being permitted (end-of-year forfeit)
  - licence conversions
- licence conversion
- trade of allocation water between accounts (detailed in Note 4)

## Additional information

Table 12 is a description of each of the table components. The account balances for the reporting period are presented in the contextual information of the GPWAR (Table 4, Table 5 and Table 6).

Table 12: Explanation of column headings for the account balances tables (Table 4, Table 5 and Table 6)

Heading	Description
<b>Share</b>	Total volume of entitlement in the specific licence category
<b>Opening balance</b>	Volume of water carried forward from previous year's allocation account
<b>AWD</b>	Available water determination: The total annual volume of water added to the allocation account because of allocation assessments
<b>Lic New</b>	Licences – New: Increase in account water because of issuing new access licences
<b>Lic Can</b>	Licences – Cancelled: Decrease in account water because of licence cancellation
<b>Drought sus In</b>	Drought suspension – In: Temporary water restriction applied, reducing account water available for use in reported water year
<b>Drought sus Out</b>	Drought suspension – Out: Temporary water restriction re-credit increasing account water available for use in reported water year
<b>Asn In</b>	Assignment – In: Increase in account water because of temporary trade in
<b>Asn Out</b>	Assignment – Out: Decrease in account water because of temporary trade out
<b>Usage Control</b>	Account usage – Controlled: Volume of water that is extracted, diverted or used and is directly accountable against a licence

Heading	Description
<b>Usage Uncont</b>	Account usage – Uncontrolled: Volume of water that is extracted, diverted or used when rules dictate that uncontrolled flow access is available. This is permitted under a General Security access licence but is not accountable against that licence. Uncontrolled usage may be converted to General Security usage when sufficient General Security water becomes available as specified by rules set out in the water sharing plan.
<b>During year forfeit</b>	Decrease in the available account balance due to mid-year forfeits that may be triggered by things such as licence subdivisions or other dealings
<b>EoY Avail</b>	End of year balance – Available: That part of the account balance that is available to be taken at the conclusion of the water year
<b>EoY NA</b>	End of year balance – Not available: That part of the account balance that is not available to be taken at the conclusion of the water year
<b>EoY forfeit</b>	End of year forfeit: Account water forfeited at the end of the water year because of carryover rules that restrict the carry forward volume
<b>Carry fwd</b>	Carry forward: Account water permitted to be carried forward into the next water year, as determined by the carryover rules.

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## Note 2—Available water determination (allocation announcement)

This is the process by which the regulated surface water asset available for use within the regulated system is determined and shared. It determines the volume of water that we add to an individual's 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' (AWD).

### 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 Peel Regulated River Water Source 2010*
  - Part 7—Limits to the availability of water
  - Division 5—Available Water Determinations.

Available on the NSW Department of Climate Change, Energy, the Environment and Water website at [www.industry.nsw.gov.au/water](http://www.industry.nsw.gov.au/water)

### Data accuracy

A1—Nil inaccuracy +/- 0%

### Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

### Data source

- Water Accounting System (jointly owned by WaterNSW and NSW Department of Climate Change, Energy, the Environment and Water)

NSW available water determination register: [waterregister.watarnsw.com.au](http://waterregister.watarnsw.com.au)

### Methodology

The AWD procedure itself is generally divided into 2 sections: the available water asset, and system commitments. Once system commitments have been met, the available water asset is then available for

distribution to the access licence categories in order of priority (Table 13). The volume of the announced allocation is expressed as the percentage of share component of the licence.

Table 13: Priority of access licence categories for AWDs

Licence category	AWD priority
General Security	Low
High Security	High
Domestic and Stock <sup>27</sup>	Very high
Local Water Utility	Very high

**Available water asset:** This is calculated by summing the water currently available in storage, future (minimum) inflows to the system, and additional volumes due to recessions of inflows from the current levels to the minimum inflow levels. Also taken into consideration is the reduction of the total inflows to the system for those that arrive too late in the season to be useful.

**System commitments:** This is an assessment of the existing commitments that have to be delivered from the available water asset in either the current or future years. Key components include:

- **essential supplies** include things such as town water supplies, stock and domestic requirements, industrial use and permanent plantings (for example, orchards, vineyards) and environmental allowances
- **undelivered account water** is the water that is already in accounts that is yet to be provided
- **end of system flow requirement** is an estimate of the flow that is required to pass through the system as a result of operation of the system
- **losses**, which are estimated as the amount of water that will be lost by the system either through evaporation or in the process of delivering the water via transmission losses.

## Additional information

Table 15 presents the allocation summary report for the reporting period. Table 14 contains notes to help interpret the report.

Table 14: Allocation summary report notes

Report heading	Description
Opening	Remaining allocation account balances at the conclusion of the previous season that is allowed to be carried forward to this season
Individual announcement	Actual announcement made to each licence category
Share component (entitlement)	Sum of the licensed volume of water within the licence category on the announcement date

<sup>27</sup> Domestic and Stock is further broken down into 3 sub-categories: Domestic and Stock, Domestic and Stock [Domestic] and Domestic and Stock [Stock]. For the purposes of this report and the general-purpose water account, they were all treated as Domestic and Stock.

<b>Report heading</b>	<b>Description</b>
<b>Allocation volume</b>	Volume of water credited to accounts within a licence category as a result of the announcement made
<b>Allocation cumulative volume</b>	Cumulative total of the announced volumes for the water year and licence category
<b>Allocation % of share</b>	This is the announced volume on the specific date expressed as a percentage of the share component.
<b>Allocation cumulative % of share</b>	Cumulative total of the announced volumes, as at the announcement date, for the water year and licence category expressed as a percentage of share component
<b>Balance available</b>	Sum of water available in allocation accounts, as at the specified date, that has been made available to be taken during the season
<b>Balance not available</b>	Water allocated that is not accessible now
<b>Balance total</b>	Sum of all the water credited to allocation accounts as at the specified date
<b>Balance available % of share</b>	Sum of water available in allocation accounts, as at the specified date, that has been made available to be taken during the season expressed as a percentage of share component
<b>Balance total % of share</b>	Sum of all the water credited to allocation accounts as at the specified date expressed as a percentage of share component

Table 15: Allocation announcements for Peel Regulated River Water Source reporting year

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 (%)
<b>Domestic and Stock</b>											
1-Jul-22	Opening	77			0.00%	0.00%	0	0	0	0.00%	0.00%
1-Jul-22	AWD 100.0 %	77	77	77	100.00%	100.00%	77	0	77	100.00%	100.00%
<b>Domestic and Stock [Domestic]</b>											
1-Jul-22	Opening	66			0.00%	0.00%	0	0	0	0.00%	0.00%
1-Jul-22	AWD 100.0 %	66	66	66	100.00%	100.00%	66	0	66	100.00%	100.00%
<b>Domestic and Stock [Stock]</b>											
1-Jul-22	Opening	20			0.00%	0.00%	0	0	0	0.00%	0.00%
1-Jul-22	AWD 100.0 %	20	20	20	100.00%	100.00%	20	0	20	100.00%	100.00%
<b>Local Water Utility</b>											
1-Jul-22	Opening	16,400			0.00%	0.00%	0	0	0	0.00%	0.00%
1-Jul-22	AWD 100.0 %	16,400	16,400	16,400	100.00%	100.00%	16,400	0	16,400	100.00%	100.00%
<b>Regulated river (General Security)</b>											
1-Jul-22	Opening	29,311			0.00%	0.00%	(32)	0	(32)	(0.10%)	(0.10%)
1-Jul-22	AWD 1.0 ML per Share	29,311	29,311	29,311	100.00%	100.00%	29,279	0	29,279	99.90%	99.90%
<b>Regulated River (High Security)</b>											
1-Jul-22	Opening	801			0.00%	0.00%	0	0	0	0.00%	0.00%
1-Jul-22	AWD 1.0 ML per Share	801	801	801	100.00%	100.00%	801	0	801	100.00%	100.00%
<b>Regulated River (High Security) [Research]</b>											
1-Jul-22	Opening	3			0.00%	0.00%	0	0	0	0.00%	0.00%
1-Jul-22	AWD 100.0 %	3	3	3	100.00%	100.00%	3	0	3	100.00%	100.00%

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## Note 3—Allocation account usage

This is the volume of water that is extracted, diverted or measured as usage under controlled river conditions and is accountable against an access licence.

### Data type

Measured data

### Policy

Not applicable

### Data accuracy

A—Estimated in the range +/- 10%

### Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

### Data source

- Water Accounting System (jointly owned by WaterNSW and NSW Department of Climate Change, Energy, the Environment and Water)

### 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. However, with multiple categories of access licences being extracted through the same pumps additional information and methodologies are needed 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 (note there are no supplementary licences in the Peel). However, announcements are also used to separate uncontrolled flow usage (non-accountable) from general-security usage (accountable).
- Usage is 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 Table 16. The ranking is based on the nature and rules of each of the licence categories.

Extractions are apportioned in order of priority, starting at priority 1. 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 these.

Table 16: Licence category metered usage apportionment

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

## Additional information

Total annual account usage for the reporting period is presented in Table 17.

Table 17: Account usage summary reporting period

Licence category	Account usage (ML)
Domestic and Stock	14
Domestic and Stock [Domestic]	30
Domestic and Stock [Stock]	0
Local Water Utility	7,554
General Security <sup>28</sup>	2,547
High Security	84
High Security (Research)	0
<b>Total</b>	<b>10,228</b>

<sup>28</sup> Excludes uncontrolled flow extractions not debited to the access licence account



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## Note 4—Temporary trading— allocation assignments

This represents the temporary trading (allocation assignments) of account water between allocation accounts within the regulated Peel water source and between the Peel and Lower Namoi regulated river water sources. Allocation assignments are permitted between certain categories of access licences, and additionally from the Peel Regulated River Water Source to the Lower Namoi Regulated River Water Source, subject to the rules stipulated in the Peel water sharing plan. The rules determine a maximum amount of share component that can be permanently transferred from the Peel to the Lower Namoi, which is related to the maximum amount of temporary trade that can occur.

### Data type

Administration

### Policy

- *Water Management Act 2000*
  - Dealings with access licences (Division 4)
    - 71T Assignment of water allocations between access licences.
- *Water Sharing Plan for the Peel Regulated River Water Source 2010*
  - Part 11 Access licence dealing rights
    - Clause 86 Assignment of water allocations dealings

### Data accuracy

A1—Nil inaccuracy +/- 0%

### Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

### Data source

- Water Accounting System (jointly owned by WaterNSW and NSW Department of Climate Change, Energy, the Environment and Water)

### Methodology

Allocation assignment transactions are extracted from the Water Accounting System.

## Additional information

Table 18: Peel River internal trade summary for reporting period (figures in ML)

Allocation assignments	To general security	Total
From general security	450	450
From high security	0	0
Total	450	450

---

## Note 5—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 because 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 they are subject to the same operating 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 the water requirements of, specific environmental events or incidents.

### Data type

Measured

### Policy

- *Water Management Act 2000*
- *Water Sharing Plan for the Peel Regulated River Water Source 2010*
  - *Part 9, Division 1, Accounting for water allocation accounts*

Available on the NSW Department of Climate Change, Energy, the Environment and Water website at [www.industry.nsw.gov.au/water](http://www.industry.nsw.gov.au/water)

### Data accuracy

A1—Nil inaccuracy +/- 0%

### Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

### Data source

- Water Accounting System (jointly owned by WaterNSW and NSW Department of Climate Change, Energy, the Environment and Water)

NSW available water determination register: [waterregister.waternsw.com.au](http://waterregister.waternsw.com.au)

## Methodology

Not applicable

## Additional Information

Table 12 provides a description of each component within the summary report. The account balances for the reporting period are presented in the contextual information of the GPWAR (Table 5).

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## Note 6—Environmental provisions

There are several planned environmental provisions within the regulated Peel water source that are implemented under the water sharing plan. These provisions aim to enhance environmental benefits.

### Environmental contingency allowance

Following the augmentation of Chaffey Dam to 100,500 megalitres, the water sharing plan required the environmental stimulus flow requirement to be abolished and be replaced through the introduction of an environmental contingency allowance (ECA). The ECA may be used discretionally and is managed to achieve natural variability in the upper regulated reaches of the Peel River.

Whenever an available water determination (AWD) is made for Regulated River (General Security) access licence holders, a volume will be credited to the ECA account, equal to the AWD multiplied by 5,000. In accordance with the Peel Water Sharing Plan, unused water in the ECA at 30 June each year will be forfeited.

### Environmental stimulus flow

A planned environmental rule for an environmental stimulus flow releases was active in the Peel from the commencement of the water sharing plan to the 2015–16 water year. The rule has now been superseded by the introduction of the ECA.

### Minimum storage release

A minimum daily release will be made from Chaffey Dam that is equal to 3 megalitres, except when a release of greater than 3 megalitres per day is required to meet basic landholder rights and access licence extractions, or when an environmental stimulus release is occurring.

### Inter-valley trade account usage

If the sum of share components of all access licences that specified the Peel Regulated River Water Source and have been subject to a permanent trade to the Lower Namoi Regulated Water Source, plus the temporary trade to the Lower Namoi Regulated Water Source, in that water year, exceeds 7,500 megalitres, then an inter-valley trading account will be established.

A volume of water will be allocated to the inter-valley trading account equal to any subsequent available water determination made for Regulated River (General Security) access licences, multiplied by 40% of the sum of share components for all access licences that were traded to the Lower Namoi, up to a maximum of 3,000 megalitres. Water allocated to the inter-valley trading account will not be carried over from one water year to the next. The release of water set aside in Chaffey Dam shall be determined by WaterNSW to meet any water requirements to the Lower Namoi Regulated River Water Source and cannot be used to satisfy water requirements in the Peel Regulated River Water Source.

## Long-term average annual extraction limit

Extractions must be limited to a long-term average annual of 15,100 megalitres.

## Uncontrolled flow restrictions

Rules and limits about the taking of uncontrolled flow from high runoff or resulting from an environmental stimulus flow event are detailed in the water sharing plan, with the remaining volume of these events being reserved for environmental benefit.

## Data type

Measured/Administration

## Policy

- *Water Sharing Plan for the Peel Regulated River Water Source 2010*
  - Part 4 Environmental Water Provisions
    - Division 1 Planned Environmental Water

Available on the NSW Department of Climate Change, Energy, the Environment and Water website at [www.industry.nsw.gov.au/water](http://www.industry.nsw.gov.au/water)

## Data accuracy

A1—Nil inaccuracy +/- 0%

## Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

## Data source

WaterNSW Annual Compliance Report (internal document)

## Methodology

Not applicable

## Additional Information

Historical annual accounting of the environmental contingency allowance is provided in Table 19.

Table 19: Summary of ECA account balance (figures in ML)

<b>Water Year</b>	<b>Opening</b>	<b>Credit</b>	<b>Usage</b>	<b>Forfeiture</b>	<b>Carry forward</b>
<b>2016-17</b>	0	5,000	4,933	67	0
<b>2017-18</b>	0	5,000	2,662	2,338	0
<b>2018-19</b>	0	1,900	0	1,900	0
<b>2019-20</b>	0	0	0	0	0
<b>2020-21</b>	0	4,200	1,170	3,030	0
<b>2021-22</b>	0	5,000	0	5,000	0
<b>2022-23</b>	0	5,000	0	5,000	0

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## Note 7—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 that can't be accessed under normal operating conditions (for example, volume below low-level outlet). It is assumed that the dead storage can be accessed if required via alternative access methods (for example, syphons).

### Data type

Derived from measured data

### Policy

Not applicable

### Data accuracy

A—Estimated in the range +/- 10%

### Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

### Data source

WaterNSW—HYDSTRA

### Methodology

Storage volumes are calculated by processing a gauged storage elevation through a rating table that converts it to a volume. Table 20 provides a breakdown of the storage capacities and dead storages.

Table 20: Capacity and dead storage summary

Storage	Capacity (ML) to May 2016	Current capacity (ML)	Dead storage volume (ML)
Chaffey Dam	61,830	100,500	2,360
Dungowan Dam	6,300	6,300	300

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## Note 8—River channel storage

This is 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 Department of Climate Change, Energy, the Environment and Water

## Data sources

WaterNSW: 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 21: Summary of calculation components

Symbol	Variable	Data source	Unit
Q	Average flow in the river section calculated by averaging 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.
- We assume that daily flow change between gauging sites is linear.

---

## Note 9—Storage inflow—Chaffey and Dungowan

Storage inflow refers to the volume of water flowing into the headwater storages, Chaffey and Dungowan Dam.

### Policy

Not applicable

### Data type

Derived from measured data

### Data accuracy

A—Estimated in the range +/- 10%

### Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

### Data sources

- WaterNSW: HYDSTRA, Tamworth Regional Council spreadsheet
- NSW Department of Climate Change, Energy, the Environment and Water: 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 as a back-calculation of inflows.

With the exception of Dungowan storage inflow (which used a basic annual mass-balance approach), the back-calculation figures were derived using a one-day time step, with the inflow calculated according to the equation below. Daily inflows are then summed to provide an annual inflow figure.

$$\sum_{i=1}^n I_i = \Delta S_i + O_i + Se_i + \frac{(E_i - R_i) * A_i}{100}$$

Table 22: Components for back-calculation of inflow

Symbol	Variable	Unit
I	Inflow	ML/day
$\Delta S_i$	Change in storage volume	ML
$O_i$	Outflow	ML/day
$Se_i$	Seepage	ML/day

Symbol	Variable	Unit
$R_i$	Rainfall	mm/day
$E_i$	Evaporation (Mortons shallow lake estimation, SILO)	mm/day
$A_i$	Surface area— derived from height to surface areas lookup curve	ha
$n$	Number of days in the reporting period	-

Assumptions and approximations:

- Constant storage specific pan evaporation factors are applied (one annual factor).
- Seepage was assumed to be zero.
- Evaporation and rainfall for Dungowan storage was derived from the simulated net evaporation for the storage in the Peel Integrated Quantity and Quality Model.

---

## Note 10—Storage evaporation and storage rainfall

This refers to the volume of water effective on Chaffey Dam and Dungowan Dam 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 Department of Climate Change, Energy, the Environment and Water

### Data source

- NSW Department of Climate Change, Energy, the Environment and Water: IQQM
- WaterNSW: HYDSTRA

### Methodology

The volume applied for evaporation and rainfall on these storages is achieved by first calculating a daily time-series of storage surface area, using a height to area lookup curve as defined in HYDSTRA for Chaffey, and from the department's planning model, IQQM, for Dungowan Dam.

Daily rainfall and evaporation data is then applied to the area time-series to achieve a volume in megalitres that is then aggregated to an annual figure. The rainfall and evaporation data used is equivalent to the data used to derive storage inflow (detailed in Note 9), with the same pan factor applied to the evaporation data

Rainfall volume (ML) =

$$\sum_{i=1}^n V_i = \frac{R_i \times A_i}{100}$$

Evaporation volume (ML) =

$$\sum_{i=1}^n V_i = \frac{E_i \times A_i}{100}$$

Table 23: Components for storage evaporation and rainfall

Symbol	Variable	Unit
V	Volume	ML/year
R	Rainfall	mm/day
A	Surface area—derived from height to surface areas lookup curve	Ha
E	Evaporation (Mortons shallow lake estimation, SILO)	mm/day
i	Number of days in the reporting period	-

---

## Note 11—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 Department of Climate Change, Energy, the Environment and Water

### Data source

- NSW Department of Climate Change, Energy, the Environment and Water: HYDSTRA, ARCGIS
- Queensland Government: 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 2 gauging locations using ARCGIS and as such an area for each reach can be defined.

$$\text{Area (m}^2\text{)} = \text{Average W (m)} \times \text{L (m)}$$

In the formula, 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 that is then aggregated to an annual figure.

No estimate was made for the river section between Dungowan storage and its confluence with the Peel River, due to insufficient data.

**Rainfall:**

$$\sum_{i=1}^n V_i = \frac{R_i \times A_i}{10^6}$$

**Evaporation:**

$$\sum_{i=1}^n V_i = \frac{ETO_i \times K_c \times A_i}{10^6}$$

Table 24: Components for storage evaporation and rainfall

Symbol	Variable	Unit
<b>V</b>	Volume	ML/year
<b>R</b>	Rainfall	mm/day
<b>A</b>	Surface area—derived from height to surface areas lookup curve	m <sup>2</sup>
<b>ETO</b>	Reference evapotranspiration from SILO	mm/day
<b>Kc</b>	Crop coefficient for open water (1.05)	-
<b>i</b>	Number of days in the reporting period	-

---

## Note 12—Gauged tributary inflow

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

### Policy

Not applicable

### Data type

Measured data

### Data accuracy

A—Estimated in the range +/- 10%

### Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

### Data sources

- WaterNSW: 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. For the gauging station at Goonoo Goonoo Creek at Meadow Lane (419097), installed for flood warning purposes, anecdotal evidence from the field has identified an issue with the very low flow rating for this site (that is, visual flow apparent, where the gauged data indicates zero).

Given the locality of this site, it is still regarded as a preferential gauge for water accounting purposes. Therefore, to compensate for potential low flow inaccuracies, a relationship was developed using the upstream station of Goonoo Goonoo Creek at Timbumburi (419035).

The median ratio of flow between the 2 sites between (419097 divided by 419035), for flows less than or equal to 20 megalitres per day, and greater than or equal to 5 megalitres per day (at 419097) was determined. This ratio (1.38) was then used to create a modified time-series at 419097.

Where flow recordings are less than 5 megalitres per day at 419097 and greater than one megalitre per day at 419035, the estimated flow is determined as 419097 flow multiplied by 1.38. For flow recordings outside of this range, the recording at 419097 is accepted as accurate. No lag was identified between the 2 stations for the daily flow calculation (that is, actual lag is less than one day).

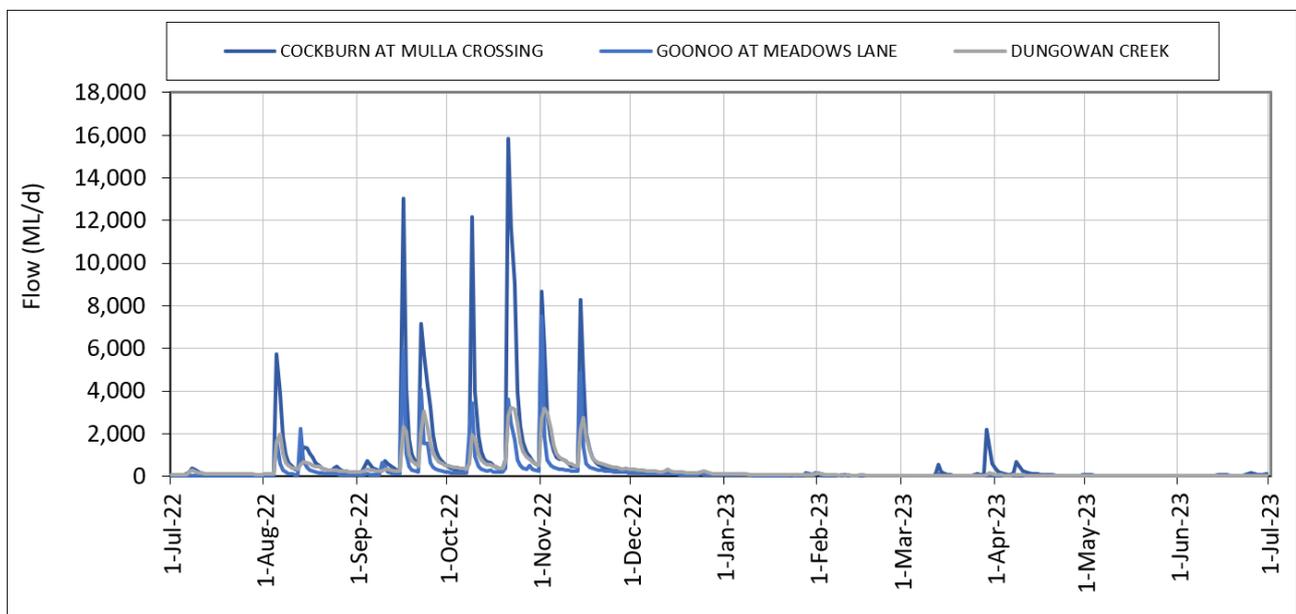
## Additional information

Measured (gauged) inflow contributions from tributary flows during the reporting period are itemised in Table 25, and illustrated as average daily flow rates in Figure 33.

Table 25: Summary of gauged tributary inflow for the reporting period (annual volume in megalitres)

Station name	Volume
Goonoo Goonoo Creek at Meadow Lane	85,204
Cockburn River at Mulla Crossing	222,550
Dungowan Creek	120,975
<b>Total</b>	<b>428,729</b>

Figure 33: Gauged tributary inflows for reporting period



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## Note 13—Ungauged runoff estimate

This figure represents an estimate of the ungauged inflow component from runoff into the river, downstream of the headwater storages.

### Policy

Not applicable

### Data type

Estimated

### Data accuracy

C—Estimated in the range +/- 50%

### Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

### Data sources

- NSW Department of Climate Change, Energy, the Environment and Water, WaterNSW: 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.

$$UI = EoS - SR - GI - GW + E + LE$$

Where:

- UI = Ungauged inflow estimate
- EoS = Gauged flow at the point in the system where no further inflow is estimated downstream. For this calculation, consider this to be the Peel River at Carroll Gap.
- SR = Storage release (Chaffey)
- GI = Gauged inflows
- GW = Net groundwater flow back to river
- E = Extractions
- LE = Estimated loss. Loss was assumed to be 10% of the measured flow (gauged flow plus storage releases) entering the system. No adjustment was made for losses associated with the ungauged component.

---

## Note 14—Dam releases, river inflow from dam releases

This is the volume of water released from Chaffey Dam, and gauged flow from Dungowan Creek<sup>29</sup>. In the GPWAR accounting process, this release volume decreases the relative storage asset, while increasing the river asset volume.

### Policy

Not applicable

### Data type

Measured data

### Data accuracy

A—Estimated in the range +/- 10%

### Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

### Data sources

- WaterNSW: HYDSTRA

### Methodology

The flows are obtained by measuring river heights at a gauging station downstream of the dam wall or lake storage, and then passing these heights through a rating table that converts them to a daily flow volume. River inflow sourced from storage release is summarised in Table 26. All releases from Chaffey and Dungowan during the reporting period are provided.

### Additional information

Measured inflow contributions from storage release and discharge contributions from gauged flow during the reporting period are itemised in Table 26 and illustrated as average daily flow rates in Figure 34.

Table 26: Summary of storage releases and gauged flow for reporting period (ML)

Storage	Release (ML)
Chaffey	123,451
Dungowan Dam (pipe)	1,166
Dungowan Dam (Valve/spill)	34,787

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<sup>29</sup> Releases from Dungowan Dam have been calculated as part of gauged flow from Dungowan Creek (Dungowan Dam releases directly into Dungowan Creek) to form part of the river system inflow.

Storage	Release (ML)
Total increase to river asset	159,404

Figure 34: Chaffey Dam releases

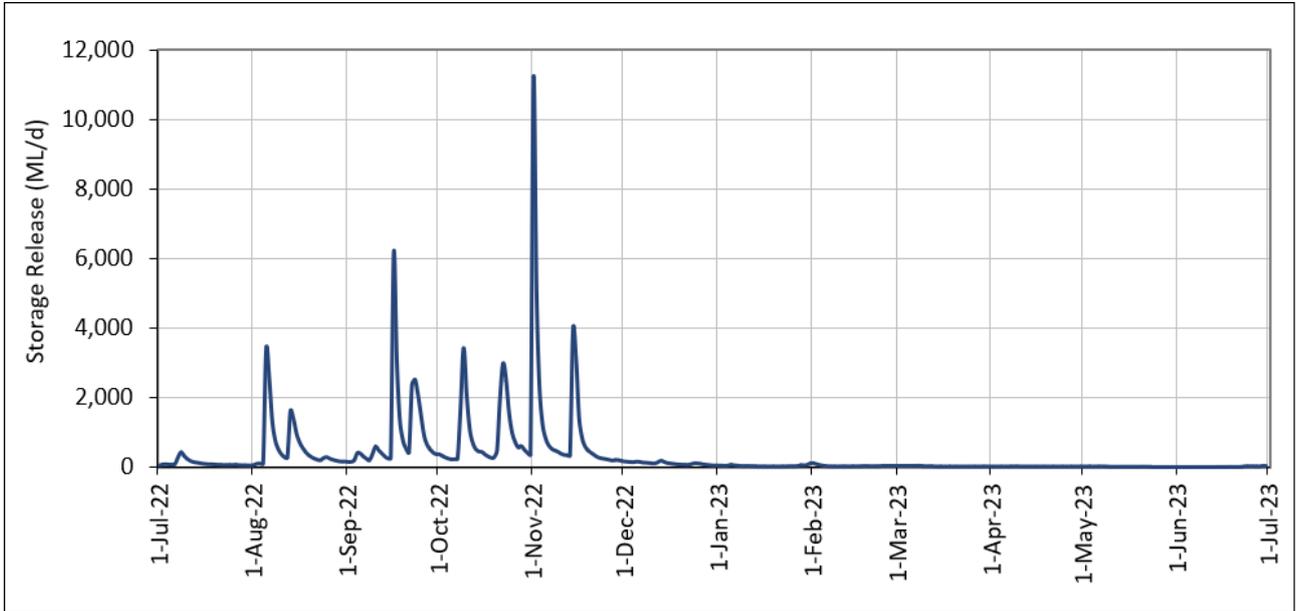
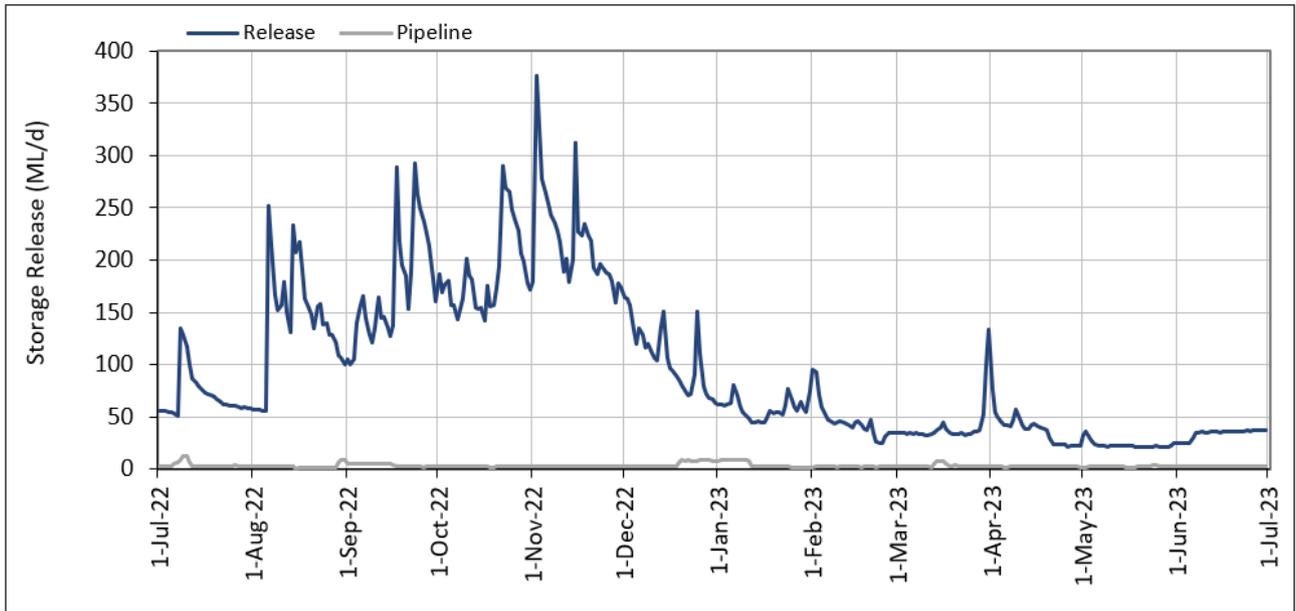


Figure 35: Dungowan Dam release



## Note 15—Flow leaving

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

## Data type

Derived from measured data

## Policy

Not applicable

## Data accuracy

A—Estimated in the range +/- 10%

## Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

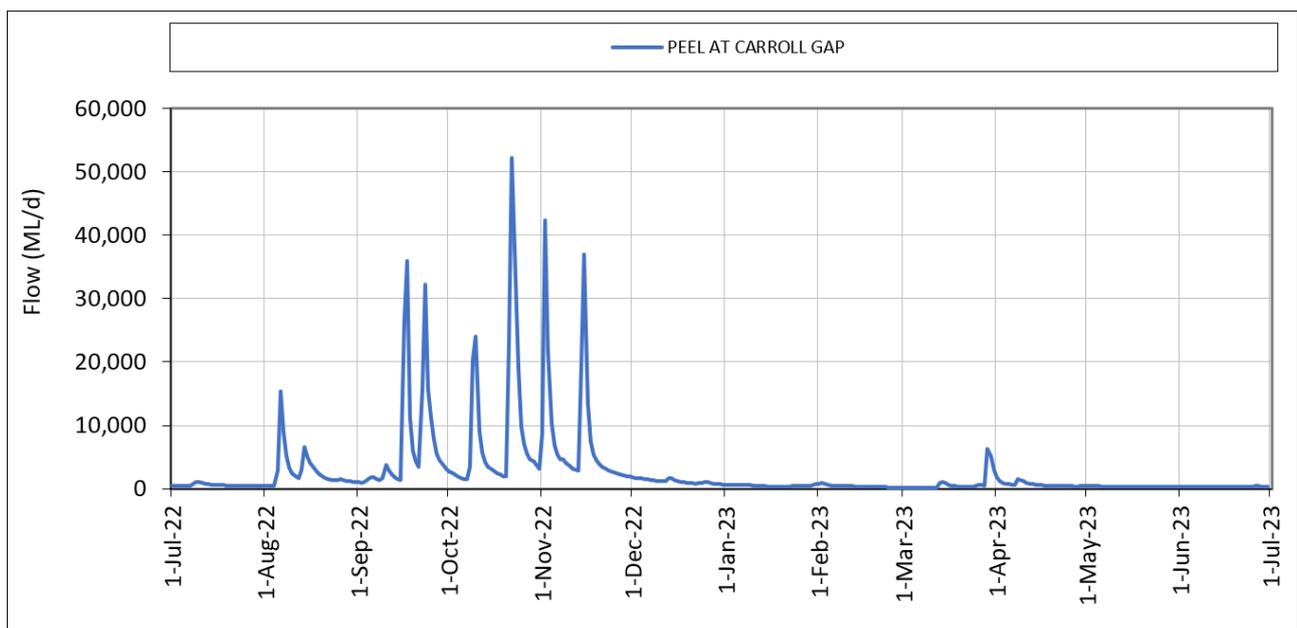
## Data source

- WaterNSW: HYDSTRA

## Methodology

The end of system flow is taken as the flow measured at the flow gauging station Peel River at Carroll Gap. Heights are measured at the station before passing these values through a flow rating relationship curve that outputs an associated flow rate. Daily flows are then added to achieve the annual result provided in this GPWAR. Average daily flow during the reporting period is illustrated in Figure 36.

Figure 36: Flow leaving accounting extent during reporting period (Peel River at Carroll Gap)



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## Note 16—Extractions from river (excluding basic rights)

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 targets. As such, the volume reported to be physically extracted from the river will not always be equal to the amount of water debited to accounts for usage, which has been reported in detail in Note 3. In addition, any uncontrolled flow usage (extracted from the river but not debited to licence accounts) must be considered. The figure for extractions from the 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 Department of Climate Change, Energy, the Environment and Water

### Data source

- Water Accounting System (jointly owned by WaterNSW and NSW Department of Climate Change, Energy, the Environment and Water)

### 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, plus uncontrolled flow extractions. These volumes are generally associated with environmental water orders and have already been accounted for in other line items.

## Additional information

Table 27: Reconciliation of physical extraction to account usage

Component	Volume (ML)
Extractions from river <sup>30</sup>	10,228
Licensed flow leaving system <sup>31</sup>	0
In-stream licenced usage <sup>32</sup>	0
Uncontrolled flow extractions <sup>33</sup>	0
Total account usage <sup>34</sup>	10,228

---

<sup>30</sup> River extractions excluding basic rights usage estimate

<sup>31</sup> Licenced water ordered to leave the accounted Peel extent for environmental benefits (or other) is removed if volume can be quantified as it would already be accounted in the flow leaving volume

<sup>32</sup> Water ordered and used within the accounted system for environmental benefit (not extracted from the river) is removed if volume can be quantified

<sup>33</sup> Water extracted in defined high flow events under a General Security licence that does not debit the allocation account.

<sup>34</sup> The total amount of water accounted for usage against the allocation accounts.

---

## Note 17—Uncontrolled flow usage

This refers to a specific volume of non-debit water, uncontrolled flow as defined in the water sharing plan, pumped or diverted from the river for consumptive use by general-security licence holders during announced periods of unregulated inflows to the water source. However, the volume pumped during these unregulated inflow events is limited, based on the rules defined in the water sharing plan where volumes pumped in excess of the limit are debited against the licence holder's general-security account.

### Data type

Measured data

### Policy

- *Water Sharing Plan for the Peel Regulated River Water Source 2010*
  - Part 9 Rules for managing access licences
    - Division 2—Taking of uncontrolled flows
      - ◆ Clause 57 Taking of uncontrolled flows under Regulated River (General Security) access licences

Available on the NSW Department of Climate Change, Energy, the Environment and Water website at [www.industry.nsw.gov.au/water](http://www.industry.nsw.gov.au/water)

### Data accuracy

A1—Nil inaccuracy +/- 0%

### Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

### Data source

- Water Accounting System (jointly owned by WaterNSW and NSW Department of Climate Change, Energy, the Environment and Water)

### Methodology

Announcements of access to uncontrolled flow can only be made for the following sections and conditions:

#### Sections

- Chaffey Dam to Paradise Weir
- Paradise Weir to Attunga Creek
- Attunga Creek to the Namoi River.

## Conditions

- When available water determinations for General Security access licences is less than 0.35 megalitres per unit share, access to uncontrolled flow will commence when the flow at Carroll Gap is equal to or less than 40 megalitres per day and cease when flows at any gauging station in the Peel River falls below 5 megalitres per day.
- When available water determinations for General Security access licences is greater than 0.35 megalitres per unit share, access to uncontrolled flow will commence when the flow at Carroll Gap is greater than or equal to 50 megalitres per day and cease when flows fall below 50 megalitres per day.

Uncontrolled flow usage is measured in the same way as general-security extractions but is tagged as uncontrolled flow in the accounting system. Under specific rules, as outlined in the water sharing plan, the uncontrolled usage will be debited against the general-security account in a water year. The summary of these rules is given below:

- Uncontrolled flow pumping is restricted to 50% of the forecast uncontrolled flow volume.
- The volume of uncontrolled flow that can be taken is equal to the difference between the maximum sum of AWDs that can be made and the actual sum of AWDs for that water year.
- If uncontrolled usage exceeds the difference between the maximum sum of AWDs that can be made and the actual sum of AWDs for that water year, then the exceedance will be debited against the general-security allocation account.

As uncontrolled flow is extracted through the same pumps as those extracting water under other categories of access licences, more information is needed to identify periods and hence volumes of uncontrolled flow extractions. To do this, holders must notify us of their intent to pump before pumping or diverting water during a declared uncontrolled flow event. They must give meter readings both at the start and end of pumping. This enables the uncontrolled flow extraction to be assessed independently of the other categories of access licences.

Additional rules that dictate the access to uncontrolled flow during periods of ECA and stimulus flow release can be viewed in the water sharing plan.

## Additional information

No uncontrolled flow usage occurred in the reporting period.

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## 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 Management Act 2000*

### Data accuracy

C—Estimated in the range +/- 50%

### Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

### Data source

- *Water Sharing Plan for the Peel Regulated River Water Source 2010*

### Methodology

The annual extraction for Domestic and Stock rights in this GPWAR is assumed to be the estimated figure stated in the *Water Sharing Plan for the Peel Regulated River Water Source 2010*. The figure is produced from 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 day (converted to megalitres per year for this GPWAR)

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## Note 19—River and groundwater interaction

This note refers to the net result of flows from the connected alluvium to the accounted river extent (increase in water asset) and from the accounted river extent to the alluvium aquifer (decrease in water asset).

### Data type

Modelled

### Policy

Not applicable

### Data accuracy

D—Estimated in the range +/- 100%

### Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

### Data source

- NSW Department of Climate Change, Energy, the Environment and Water (data inputs from WaterNSW HYDSTRA-GW, Water Accounting System)

### Methodology

River and groundwater interaction have been presented as a net figure due to inaccuracies identified when attempting to separate the individual processes.

An estimation based on the relationships developed between the river stage and historical MODFLOW model results is used. The river gauging site 419015 (Peel River at Piallamore) was used to develop the relationship for the Peel Groundwater Management Area.

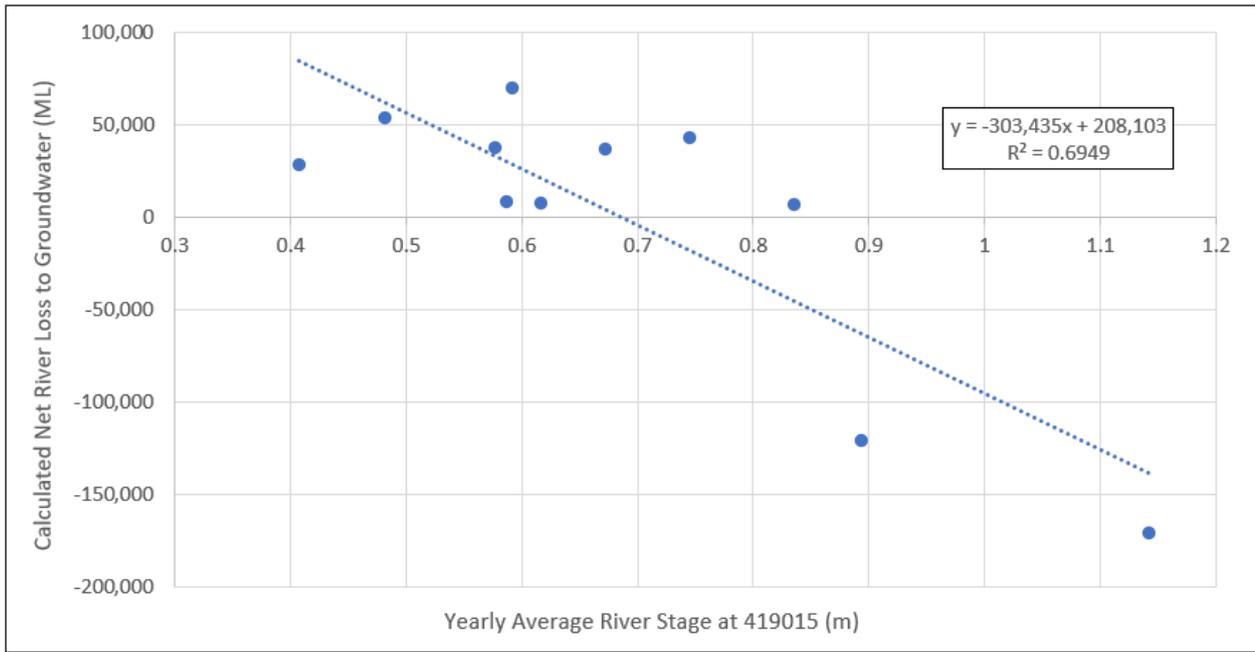
The chart used to analyse the historical river flows to the Peel Groundwater source is provided at Figure 37. The resulting equations used for estimating the accounting inputs are as follows:

Peel Groundwater management Area:

$$\text{Net River Flow to Aquifer} = -303,435 \times \bar{H} + 208,103$$

Where  $\bar{H}$  is the average annual river stage.

Figure 37: Net River flow to Peel Groundwater analysis chart



No estimates were made for interactions with the river outside the area covered by the Peel groundwater source.

### Additional information

No annual groundwater budget from Method B is available for the reporting period at the time of reporting.

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## Note 20—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, because of uncertainty about many of the volumes presented in the accounts, the variety of data sources and not all water cycle processes being accounted for, the statements are not balanced at the end of the accounting process. To balance the accounts, a final balancing entry is required, and this is termed the unaccounted difference. As technology improves the accuracy of the account estimates, we anticipate that, relatively, this figure should be lower 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 needed to get the correct volume in river at the end of the reporting period, after all the known physical inflows and outflows have been accounted for. The double-entry accounting process attempts 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 8.

Surface water unaccounted difference:

$$U_{SW} = R_s - R_c + R_i - R_o$$

Where:

- $U_{SW}$  = Unaccounted difference for surface water
- $R_s$  = Opening river volume estimate
- $R_c$  = Closing river volume estimate
- $R_o$  = Physical outflows from the river (for example, extractions)
- $R_i$  = Physical inflows to the river (for example, runoff, return flows, dam releases)

## Additional information

Volumes for the unaccounted difference are presented as a surface water decrease for the purposes of this GPWAR. A negative unaccounted difference would indicate that extra inflow (surface water increase) was required to balance the accounts. A summary of the unaccounted difference relative to river inflow is presented in Table 28.

Table 28: Unaccounted difference summary

Water year	Unaccounted volume <sup>35</sup>	River system inflow <sup>36</sup>	% of river system inflow <sup>37</sup>
2016–17	48,633	382,806	13%
2017–18	32,819	80,774	41%
2018–19	(2,598)	33,038	(8)%
2019–20	5,326	65,995	8%
2020–21	(5,868)	326,504	(2)%
2021–22	49,576	679,777 <sup>38</sup>	7%
2022–23	(99,855)	948,577	(11)%

<sup>35</sup> Negative indicates more system inflow required to achieve mass balance

<sup>36</sup> Inflows into the River system include *Rainfall, Gauged Inflow, Ungauged Inflow, Inflow from Storage releases*.

<sup>37</sup> Unaccounted difference (of the river) as a % of the total river inflow. i.e. Absolute volume as a percentage

<sup>38</sup> For this reporting period, releases from Dungowan Dam have been calculated as part of gauged flow from Dungowan Creek (Dungowan Dam releases directly into Dungowan Creek) to form part of the river system inflow.

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## Note 21—Dungowan pipeline diversion

In addition to an allocated dam in the Chaffey Dam resource, Tamworth also has a supplementary supply for town water purposes from Dungowan Dam, which is owned and operated by Tamworth Regional Council. This water is supplied to town through a 60-kilometre, 500-millimetre diameter pipeline directly to the Calala Water Treatment Plant (Cameron, 2009).

### Data type

Measured.

### Policy

Not applicable.

### Data accuracy

A—Estimated in the range +/- 10%.

### Providing agency

Tamworth Regional Council.

### Data source

- Excel spreadsheet

### Methodology

Weekly recorded figures in megalitres were aggregated to an annual figure. In the accounting process, this is a direct decrease to the surface water storage as the water does not arrive in the accounted river like other storage releases.

# References

- Cameron, Adrian 2009, *Well, Well, Well – Drift Well Recommissioning, an Operators Perspective*, Tamworth Regional Council, 3<sup>rd</sup> Annual WIOA NSW Water Industry Engineers and Operators Conference
- WASB 2012, Australian Water Accounting Standard 1 Preparation and Presentation of General Purpose Water Accounting Reports (AWAS 1), Bureau of Meteorology