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Introduction

This annual operations plan provides an outlook for the coming year in the Namoi Valley. The plan considers the current volume of water in storage and weather forecasts. This plan may be updated as a result of significant changes to the water supply situation.

Due to the current low water storage levels and the forecast of dry conditions to continue over the valley at least up to the end of the year, this year’s plan outlines WaterNSW’s response to the drought in the Namoi Valley including:

- identification of critical dates
- our operational response
- potential projects to mitigate the impact of the drought on customers and communities within the valley.

The NSW Department of Planning, Industry and Environment’s Extreme Events Policy and Incident Response Guides outline 4 stages of drought. The Upper and Lower Namoi Regulated River systems are both assessed to be in stage 4, which is categorised as ‘severe drought/water shortage’.

The Namoi River system

The Namoi River flows from its eastern source in the Great Dividing Range, through the Namoi Valley in a westerly direction to its confluence with the Barwon River, between Collarenebri and Brewarrina. Multiple tributaries enter the Namoi River as it travels through the valley including:

- Peel River
- Maules Creek
- Coxs Creek
- Bohena Creek
- Baradine Creek.
Regulated and unregulated system flow trends

The upper part of the Namoi catchment is bordered by the steep ranges and elevated tablelands of the Great Dividing Range. The Namoi River (the McDonald River becomes the Namoi north-east of Manilla) and several of its main tributaries have their headwaters in the range, in country that is 1,500 metres (m) above sea level, and where annual rainfall averages 800-1,000 millimetres (mm).

Many of the Namoi’s tributaries meet the river in the foothills of the ranges, including the Peel River, which is a regulated tributary running through the city of Tamworth and accounts for 11% of the Namoi catchment area. Beyond the town of Gunnedah, the Namoi River is the main waterway that runs west through undulating country. The catchment is bounded by the Nandewar Ranges and Mount Kaputar in the north, and the Liverpool and Warrumbungle ranges in the south.

Downstream of Narrabri, the catchment is flat floodplain country - around 100 m above sea level and with annual rainfall as low as 400 mm. The Namoi continues its journey west across the floodplain along a primary channel (up to 50 m wide and 6 m deep) with a network of anabranches and tributaries. About a quarter of the floodplain is prone to frequent flooding. At the western end of the valley (near Walgett), a number of flood runners (small anabranches) break away from the river and carry water through to the Barwon River during high flows.

Keepit Dam, on the Namoi River just upstream of Gunnedah, was completed in 1960 as a major irrigation storage holding 426,000 megalitres (ML). At times, water can be released from the dam to flow to Walgett, which is over 300 kilometres downstream, and provides for flood mitigation in the valley. Keepit Dam also generates hydropower through a six-megawatt hydropower station.

Split Rock Dam, on the Manilla River, holds 397,000 ML and was completed in 1987 to augment the supply from Keepit Dam, as well as to supply local irrigators on the river.

Cattle and sheep grazing is the main land use in the catchment. The region is a significant producer of grain crops, both dryland and irrigated. While irrigation occupies only about 3% of the catchment, it contributes significantly to the regional economy. Grain crops, cereals, oilseed and legumes are grown under irrigation, in rotation with cotton. Lucerne production for hay is common in the valley, especially around Tamworth. Other industries include forestry and mining.

Rainfall trends

For the period April 2017 to March 2019, lowest-on-record rainfall was observed over southern inland Queensland and areas of northwestern New South Wales. Over most of this area, rainfall for the period was less than 50% of the 1961–1990 average. Large areas from central to southwestern Queensland, and northcentral and northwestern New South Wales, into northeastern South Australia, have seen rainfall totals between 40% to 60% of this average, implying that nearly one year’s worth of average rainfall has been missed over this two-year period.

The recent dry periods have been especially severe during the cooler months of April to September, an important time for agriculture and the replenishment of surface and groundwater storages across southern Australia. Averaged over the Murray-Darling Basin (MDB), the total rainfall over two consecutive April to September periods was the lowest on record, at 217.5 mm. This is around 15% below the previous record, which saw 255.7 mm over the 1940–41 April to September period. It was also the only instance of an April to September rainfall total below 225 mm in two consecutive years.

Rainfall for the combined two-year 2017 and 2018 April to September period was the lowest on record and very much below average (lowest 10% of all such periods) for large parts of southeastern and southwestern Australia. Around 50% of New South Wales was lowest-on-record for these two periods combined.
The winter of 2019 again saw dry conditions, which now means three consecutive winters of below average rainfall.

Over the 24-month period, there has been a large decline in water resources in the northern half of the MDB, including over the Namoi and Upper Macquarie catchments. The Namoi has had the second lowest-on-record rainfall for equivalent 24-month periods, with rainfall around 62% of the 1961–1990 average. Rainfall in the Upper Macquarie catchment is around 71% of the average.

Water users in the valley

**Basic Land Holder Rights (BLR)**

BLR includes water for Domestic and Stock extracted from a water source fronting a landholder’s property, or from any aquifer underlying the land, and for native title rights.

Domestic and Stock rights:
- in the Upper Namoi Regulated River water source are estimated to be 160 megalitres per year (ML/year)
- in the Lower Namoi Regulated River water source are estimated to be 1,776 ML/year.

The water supply system shall be managed so that it would be capable of maintaining supply to those exercising Domestic and Stock rights through a repeat of the worst period of low inflows into these water sources (based on historical flow as at 1 July 2004).

To achieve this, sufficient volumes of water must be set aside from assured inflows into these water sources and in reserves held in Split Rock Dam water storage, Keepit Dam water storage and other water storages.

**Domestic and Stock use**

The share components of Domestic and Stock access licences authorised to take water from these water sources are 2,088 ML/year, distributed as follows:
- 90 ML/year in the Upper Namoi Regulated River water source
- 1,998 ML/year in the Lower Namoi Regulated River water source.

**Local water utilities**

The share components of local water utility access licences authorised to take water from these water sources are 2,786 ML/year, distributed as follows:
- local water utility licences authorised to extract water from the Upper Namoi Regulated River water source totalled 515 ML/year
- local water utility licences authorised to extract water from the Lower Namoi Regulated River water source totalled 2,271 ML/year.

**High security**

The share components of regulated river (high security) access licences in the Namoi Regulated River water sources totals 3,984 unit shares, and is distributed as follows:
- 80 unit shares in the Upper Namoi Regulated River water source
- 3,904 unit shares in the Lower Namoi Regulated River water source.
General security

The share components of regulated river (general security) licences in the Namoi Regulated River water source are 256,528 unit shares, and is distributed as follows:

- 11,454 unit shares in the Upper Namoi Regulated River water source
- 245,074 unit shares in the Lower Namoi Regulated River water source.

The average allocations over the last 10 years in the valley is 91% for Upper Namoi Regulated River water source and 41% for the Lower Namoi Regulated River water source.

Supplementary water access licences

There are no supplementary water access licences in the Upper Namoi Regulated River water source.

The sum of the share components of supplementary water access licences authorised to extract water from the Lower Namoi Regulated River water source is 115,479 unit shares

Environmental water

In June, July and August, a minimum daily flow, which is equivalent to 75% of the natural 95th percentile daily flow for each month, shall be maintained in the Namoi River at Walgett (streamflow gauging station number 419091).

The above shall not apply when the sum of the water stored in Keepit Dam and Split Rock Dam is less than 120,000 ML.

Note: The Water Sharing Plan specifies limits to total extractions by all Lower Namoi supplementary water access licence holders during periods when flows are above specified threshold flow levels. These rules contribute to a number of interim river flow objectives:

- protecting important rises in water levels
- maintaining wetland and floodplain inundation
- maintaining natural flow variability.

By limiting long-term average extractions to an estimated 238,000 ML/year, this plan ensures that approximately 73% of the long-term average annual flow in these water sources (estimated to be 870,000 ML/year) will be preserved and will contribute to the maintenance of basic ecosystem health.

Unregulated river access licences

Namoi unregulated local water utility access licences

It is estimated that the share components of local water utility access licences authorised to take water from these water sources total 2,733 ML/year, distributed as follows:

- 463 ML/year in the Mid Macdonald River water source
- 564 ML/year in the Upper Namoi water source
- 421 ML/year in the Upper Manilla water source
- 0 ML/year in the Manilla alluvial groundwater source
- 25 ML/year in the Currabubula alluvial groundwater source
- 200 ML/year in the Quirindi alluvial groundwater source
- 1,000 ML/year in the Quirindi Creek water source.
Namoi unregulated river access licences

It is estimated that at the time of commencement of the Water Sharing Plan for the Namoi Unregulated and Alluvial Water Sources 2012, the share components of unregulated river access licences is 141,488 unit shares.

- a. 30 unit shares in the Upper Macdonald river water source
- b. 4,818 unit shares in the Mid Macdonald river water source
- c. 10,081 unit shares in the Upper Namoi water source
- d. 1,321 unit shares in the Werris Creek water source
- e. 745 unit shares in the Keepit water source
- f. 0 unit shares in the Split Rock water source
- g. 1,661 unit shares in the Upper Manilla water source
- h. 1,458 unit shares in the Rangira Creek water source
- i. 1,635 unit shares in the Bluevale water source
- j. 32,171 unit shares in the Lake Goran water source
- k. 17,521.5 unit shares in the Coxs Creek water source
- l. 1,406 unit shares in the Maules Creek water source
- m. 2,034 unit shares in the Eulah Creek water source
- n. 984 unit shares in the Bohena Creek water source
- o. 5,106 unit shares in the Bundock Creek water source
- p. 1,243 unit shares in the Brigalow Creek water source
- q. 600 unit shares in the Coghill Creek water source
- r. 1,392 unit shares in the Etoo and Talluba Creeks water source
- s. 748 unit shares in the Spring and Bobbiwaa Creeks water source
- t. 2,031 unit shares in the Pian Creek water source
- u. 2,646 unit shares in the Lower Namoi water source
- v. 19,409 unit shares in the Baradine Creek water source
- w. 161 unit shares in the Phillips Creek water source
- x. 30,287.5 unit shares in the Mooki River water source
- y. 1,740 unit shares in the Quirindi Creek water source
- z. 259 unit shares in the Warrah Creek water source.
Water availability

Water allocations in the Upper Namoi Regulated River water source for 2019-20, as of 1 July 2019:

- local water utility and Domestic and Stock water access licence holders received an allocation of 100% of entitlement
- high security water access licence holders in the Upper Namoi Regulated River water source received an allocation of 75% of entitlement
- general security water access licence holders received an allocation of 0% of entitlement
- general security carryover was restricted to 75% of the carryover volume.

Water allocations in the Lower Namoi Regulated River water source for 2019-20, as of 1 July 2019:

- local water utility and Domestic and Stock water access licence holders received an allocation of 100% of entitlement
- high security water access licence holders in the Lower Namoi Regulated River water source and its sub-categories received an allocation of 75% of entitlement
- general security water access licence holders received an allocation of 0% of entitlement
- general security carryover (12,000 ML) was restricted to 0% the carryover volume.

Current drought conditions

The system continues to experience low inflows to both Split Rock and Keepit Dams and downstream tributaries. Over the last 10 years, above average inflows occurred in three years: 2010-11, 2011-12 and 2016-17.

The inflow into Keepit Dam for the 24-month period from November 2017 to October 2019 was 17,300 ML. This inflow figure excludes Bulk Water Transfers from Split Rock to Keepit and is 24% of the minimum observed 24-month inflow of 71,800 ML.

As of 30 October 2019, Keepit Dam is at less than 1% capacity and Split Rock is at 1.3% capacity with a combined active storage volume of 8,700 ML.

**Namoi Dams storages**

**Split Rock Dam storage**

As a result of the low inflows over the past two years, the volume of water in Split Rock Dam has slowly declined since being at 30% capacity in July 2017. The graph below shows Split Rock Dam's behavior for the 2019-20 water year, compared to the last four water years.

From the figure below, it can be seen that two bulk water transfers have occurred over the past two years with Split Rock being reduced from 30% at the start of 2017-18 to 15% at the of 2018-19 and then being reduced to 3% at the start of 2019-20.
**Resource assessment**

The resource assessment is the process of calculating how much water is available based on the rules of the Water Sharing Plan (WSP). This is completed at the end of the month and when any significant inflow event occurs.

The planning horizon for this resource assessment is 24 months. Taken into consideration is the volume of water held in storage, plus the expected minimum inflows.

As of 1 November 2019, the total amount of water available in Keepit and Split Rock Dam was 18,900 ML. With severely depleted reserves, these storages will need at least 85,000 ML of inflow before normal regulated river operations can resume.
**Namoi resource assessment distribution - 1 November 2019**

- Storage Loss
- Essential supplies
- Delivery Loss
- Upper Namoi / Manilla River
- General Security irrigation
- General Security environmental

**Available Airspace**: 784,600 ML

- Deep Storage: 9,700 ML
- Storage Losses: 7,450 ML
- Upper Namoi / Manilla River: 1,800 ML

**Water balance in the Namoi - 1 November 2019**

- Available Airspace: 784,600 ML
- Deep Storage: 9,700 ML
- Storage Losses: 7,450 ML
- Upper Namoi / Manilla River: 1,800 ML

- Essential Supplies (0)
- General Security irrigation (0)
- General Security environmental (0)
Water resource forecast

Namoi Dams - past 24-month rainfall

Over the last 24 months, the total rainfall across the Namoi catchment was in the range of 400 mm to 1200 mm, which is the lowest on record. The median annual rainfall across the Namoi catchment is 800-1,000 mm per year.

Total NSW rainfall (mm) for 24 months - 1 November 2017 to 31 October 2019

NSW rainfall deciles for 24 months - 1 November 2017 to 31 October 2019
Namoi storages - past 24-month inflows/statistical inflows

The total inflow into Keepit Dam for the 24-month period from November 2017 to October 2019 was 97,600 ML - this includes two Bulk Water Transfers from Split Rock Dam. Without the Bulk Water Transfers, Keepit’s inflow was 17,300 ML or 24% of the minimum observed 24-month inflow of 71,800 ML.

Keepit Dam past 24-month inflows/statistical inflows

Split Rock past 24-month inflows/statistical inflows
Three-month weather forecast

Forecasts from the Bureau of Meteorology (BoM) indicate a warmer and drier summer ahead. The strong positive Indian Ocean Dipole (IOD) event continues, while the El Niño–Southern Oscillation (ENSO) remains neutral. The BoM indicate the positive IOD is so strong that it is likely to take several weeks to decline and could persist into mid-summer. A positive IOD typically brings below average spring rainfall to southern and central Australia, with warmer days for the southern two-thirds of the country. Positive IOD events are often associated with a more severe fire season for southeast Australia.

The figure below shows that there is a 35-40% probability of the Namoi Valley receiving above average rainfall during the December 2019 to February 2020 period.

Namoi storage forecast

While rainfall over spring is forecast to be below average, weather patterns can change - especially over summer where northern New South Wales can see increased rainfall with the northern monsoonal season.

The figures opposite demonstrate the behaviour of Namoi Dams under different inflow conditions through to October 2021.

Under wet conditions (dark blue line) with 20th percentile inflows (meaning flows that are expected to exceed in only 2 years out of 10), Keepit Dam may reach 426,000 ML (100%) and spill and Split Rock Dam may reach 110,000 ML (27%) by the end of October 2020.

Under median conditions (light blue line) with inflows expected to exceed 5 years out of 10, Keepit storage is likely to exceed 75% capacity, and Split Rock exceed 30% by the end of October 2021.

A dry scenario (green line), where conditions are expected to exceed this inflow 8 years out of 10, would still see the Keepit storage improve to above 25% capacity and Split Rock reach 8% by August 2021.

The forecast under a repeat of minimum inflow (grey) conditions indicates that Keepit Dam will stay around 5% and Split Rock around 1% of capacity by October 2021.

While the short-term forecast is for dry conditions to continue through to summer, a change in weather patterns could see conditions improve quickly.
Keepit storage forecast

Keepit forecast storage volume - chance of exceedance (COE)

Split Rock storage forecast

Split Rock forecast storage volume - chance of exceedance (COE)
**Annual operations**

**Deliverability**

- If Keepit Dam reached approximately 20,000-40,000 ML, a possible release for critical human needs or high security users may be considered. It is expected that this would provide relief to users only from Keepit to Narrabri.
- If possible, deliveries from downstream tributary flows will be made.
- With the need to preserve supplies for critical human needs in the Upper Namoi, restrictions on general security licences are likely from 1 December 2019.

**Critical human needs**

WaterNSW, in partnership with NSW Department of Primary Industries - Fisheries and NSW Office of Environment and Heritage, will be identifying critical habitat along the Namoi River and establishing a monitoring program to assess the health of these sites during the drought.

Based on the monitoring program results, water entering the Namoi from downstream tributaries may be able to be used to protect the health of critical environmental habitat.

**Basic Landholder Rights and Domestic and Stock**

Under the Water Management Act 2000, extraction of water for Basic Landholder Rights (BLR) does not require a licence. Although in the case of accessing groundwater under BLR, the water supply work must still be approved. BLR includes water for Domestic and Stock purposes extracted from a water source fronting a landholder’s property or from any aquifer underlying the land.

**Scenarios**

Inflows will be assessed on a case-by-case basis, and will likely be utilised in the following manner:

- inflows approximately 1,000 ML to 7,000 ML – likely to be passed to Walgett in the main Namoi River
- inflows 7,000 ML to 14,000 ML – a flow to Walgett in the Namoi River and attempt to run the Pian Creek replenishment flow
- inflows approximately 14,000 ML to 18,000 ML – a flow to Walgett in the Namoi River, run the Pian replenishment flow and capture up to 4,000 ML excess in Mollee and Gunidgera Weirs for later use (hierarchy of needs)
- if appropriate, permission will be sought from Department of Planning, Industry and Environment - Water (DPIE-Water) to allow access to remaining general security balances
- inflows above 18,000 ML – permission will be sought from DPIE-Water to allow access to remaining general security account balances and supplementary access as per water sharing plan rules.
## Deliverability of ordered water

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<th>Period of applicability</th>
<th>Method of placing water order</th>
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<tr>
<td><strong>Upper Namoi (Split Rock Dam to upstream of Keepit)</strong></td>
<td>High security</td>
<td>From 1 July, water shortages and/or delays in the delivery of water should be expected. Further restrictions are likely – releases may need to be grouped together (block releases), rostering may be required, or releases may need to be stopped. A water order is still required to be placed and needs to be approved by WaterNSW.</td>
<td>It is envisaged that limited water deliveries will continue until at least September 2019. WaterNSW will be consulting with customers in the coming weeks and months about future arrangements.</td>
<td>Only via customer help desk. Orders cannot be placed via iWAS. Confirmation of water order from WaterNSW is required.</td>
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<td><strong>Lower Namoi (downstream of Keepit Dam to Walgett)</strong></td>
<td>High security</td>
<td>No dam releases will be made to supply orders or the Pian Creek replenishment flow. Limited access may become available from tributary inflows. A water order is still required to be placed and needs to be approved by WaterNSW.</td>
<td>Until further notice</td>
<td>Only via customer help desk. Orders cannot be placed via iWAS. Confirmation of water order from WaterNSW is required.</td>
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Critical dates

- 1 July 2019 - Reduced allocations for high priority needs and restrictions on carryover water.
- 1 December 2019 onwards - Likely restrictions for Upper Namoi general security licences.

Projects

The following options can be considered as emergency response plans for drought management in Namoi Valley:

1. investigations into accessing deep storage at Split Rock Dam
2. Bathymetric survey of Split Rock Dam.