

## Northern NSW restrictions

*Overview of the application of the NSW Northern Basin restrictions to protect the first flush flow events through the northern valleys, the Barwon-Darling, into Menindee Lakes and the Lower Darling, and the impacts on system flows and water take.*

### What were the Northern Basin first flush restrictions?

The Northern Basin restrictions were, in effect, three temporary water restrictions orders that were applied as follows:

1. Order prohibiting the take of water by general river pumpers in all the northern valleys and the Barwon-Darling – from 17 January to 31 January, extended to 17 February and then extended again to 28 February.
2. Order prohibiting the take of water from eight designated floodplains in the Gwydir, Namoi (Upper Namoi floodplain, Narrabri-Wee Waa floodplain and the Lower Namoi floodplain), Macquarie (Narromine to Oxley floodplain) and Barwon-Darling valleys from 7 February, and the Macintyre and the Lower Macquarie from 12 February until 28 February 2020.
3. Order prohibiting the take of water by Barwon-Darling river pumpers below Culgoa and from the Barwon-Darling floodplain – from 29 February to 17 April.

The orders allowed for responsive management through certain limited pumping approvals (temporary exemptions) being given during the period of the orders. In addition, the orders allowed for the progressive lifting of restrictions as sufficient flows passed from upstream areas.

Restrictions were effectively lifted in all areas before the relevant order ended. The northern valleys and the northern floodplains were lifted by 23 February. All restrictions in the Barwon-Darling River above Culgoa were lifted on 27 February and below Culgoa on 6 March, and the Barwon-Darling floodplain by 31 March.

### What was different about these restrictions?

1. **The extent:** These restrictions were applied much more broadly and to more types of water users – both regulated and unregulated licence holders and floodplain harvesting - than had previously been applied to protect first flows after a prolonged dry period. The restrictions covered a substantial area - all the northern valleys from the Border Rivers south to the Macquarie - plus the Barwon-Darling. The restrictions applied to such a large area because of the severity of the drought across the whole northern basin, which was impacting on critical supplies both within a catchment and downstream, and the predictions of widespread rainfall. In the past the department had only applied such restrictions:

- along the Barwon-Darling to ensure that flows could pass along the river to Menindee Lakes
- along the lower Namoi and Lower Macquarie in March to May 2019 to protect high priority needs
- along the Border, Gwydir Rivers and Barwon-Darling Rivers to protect specific controlled environmental releases.

2. **Multiple rainfall and flow events:** The flows were the result of not just one rainfall event, but a series of rainfall and flow events happening over a number of months and in different locations - across both NSW and Queensland catchments.

3. **How they were managed:** These orders were proactive and introduced a new concept of responsive management. Rather than having to gazette, repeal and gazette again to apply, lift then re-apply restrictions – the orders were set for a defined period, but during the period the department could approve pumping by way of a ‘temporary exemption’ in certain areas for specified times if appropriate. This was to ensure management of the flows was responsive to local conditions. It was acknowledged that once enough flows had passed a location, and targets to restore flows downstream were forecast to be met, it was reasonable to allow pumping for upstream users. The need for restrictions was reviewed daily.

4. **Using both actual and forecast flows:** Because of the large area covered by the orders, decisions about whether pumping could be permitted were based not only on actual flows, but also on forecast downstream flows. Flows generated in the headwaters of the northern valleys or Queensland can take weeks to reach the Barwon-Darling and months to reach Menindee Lakes. For example, it was three weeks from the time the first order was gazetted (17 January) until the flows started in the Barwon-Darling River (6 February at Collarenebri). It took almost eight weeks for the flows to enter Menindee Lakes (10 March) and ten weeks (26 March) until enough water was held in the Lakes to start providing a release to the Lower Darling.

5. **Applying flow targets - Local and downstream:** For the first time flow targets were developed to assist in determining when sufficient flows had passed specified locations. These targets were based on local flows necessary to meet critical needs in each valley and to ensure that sufficient flow could pass to contribute to critical needs downstream. The targets were developed prior to the commencement of the order on 17 January 2020. A copy of the targets and principles for the restrictions is available [here](#).

6. **Including a Menindee Lakes target:** In addition to the valley targets set along the northern and the Barwon-Darling rivers, as further rainfall and flows occurred from 21 February a Menindee Lakes target of 60–70 gegalitres (GL) was set. This was subsequently increased to 200 GL on 4 March as a result of significant additional inflows forecast from Queensland. The final target of 200 GL had **no impact** on when restrictions were lifted in the northern valleys – only the Barwon-Darling. All restrictions were lifted in the northern valleys before the end of February, once it could be confidently assured that 60–70 GL would reach the Lakes.

## Why did the target for Menindee Lakes change?

In mid-January, the Bureau of Meteorology (BoM) predicted that rainfall was likely to occur across the northern NSW basin over the next week, with localised very high rainfall possible. BOM rainfall forecasts extend out to eight days only. Beyond that, rainfall cannot be predicted with any accuracy.

In mid-January, it was hoped that sufficient flows might be generated to reach the Barwon-Darling, but it would take continuing rainfall beyond the initial forecasts. By 6 February some flows were occurring in the Barwon-Darling and by 12 February sufficient flows had been generated upstream for WaterNSW to forecast that between 10 and 30 GL could reach Menindee Lakes if restrictions were maintained.

By 19 February, with further rainfall in the Namoi and Castlereagh catchments, WaterNSW was forecasting that flows of up to 60 GL could reach Menindee Lakes if most access remained restricted. By 21 February with flows of between 60-80 GL forecast, 60-70 GL was considered an

appropriate target given that this would allow for a full flush of the Lower Darling and retention of a drought refuge volume in Lake Wetherell.

On 21 February it was assessed that sufficient contributions had been provided from the northern valleys catchments and all restrictions were lifted on unregulated river access in the northern valleys and some of the northern floodplains. This was followed by the removal of the remaining northern floodplain restrictions on 23 February and some restrictions on general security access in the Border Rivers, Upper Namoi and Lower Namoi by 25 February. In late February there was major flooding in the Condamine-Balonne Basin and significant rainfall in the Warrego catchment in Queensland due to heavy rain. Queensland access was not restricted, however; based on historical precedents of flows across the border, flows well in excess of the 60 GL target at Menindee Lakes were forecast.

A decision was made to try to achieve better outcomes for the Lower Darling. The final 200 GL target was adopted on 4 March with WaterNSW forecasting that this volume could now reach Menindee Lakes. By that time, restrictions remained in place only along the Barwon-Darling River below Culgoa and on the Barwon-Darling floodplain.

## Why was it so important to get flows into Menindee Lakes?

The Lower Darling had been in Critical stage 4 drought since 2018 and by January 2020 supply behind the emergency block banks in the river was almost exhausted and the water quality was extremely poor. The Lower Darling had seen significant fish deaths in December 2018 and January 2019 because of low flows and poor water quality.

The aim of the restrictions was to provide connectivity through the northern basin. Based on the initial Bureau of Meteorology forecasts in mid-January, it was not expected that any flows would reach Menindee Lakes. However, more rainfall fell in February and by 21 February, 60-70 GL was considered an 'achievable target' for the Menindee Lakes. The final 200 GL target meant that up to 12 -18 months' supply could be provided to Lower Darling water users and this target was adopted for the Barwon-Darling restrictions. This volume was also consistent with the aims in the northern valleys to replenish town water supplies and provide a reasonable volume in the major storages for future critical needs.

## How the forecast flows influenced decision-making

Actual flows and forecast flows along the Barwon-Darling River and to Menindee Lakes were used to assess when restrictions could be lifted upstream. This information was provided by WaterNSW and also regularly published in their operational updates to licence holders to assist with tracking the progress of the flows.

The following table shows the actual and forecast flow assessments and the key points when restrictions were permanently lifted. It also highlights how quickly the assessments changed for Menindee Lakes target flows with increasing rainfall over February. The lifting of restrictions for the northern tributaries was undertaken once the lower limit of forecasts was 60-70 GL, in line with the initial target for Menindee Lakes.

# Northern Basin Restrictions



## Overview and water taken

**Table 1: Actual and forecasts flows along the Barwon-Darling and into Menindee Lakes during February and March 2020**

Date	@ Bourke		@ Wilcannia		@Menindee Lakes		
	Total Actual Flow GL	Total Forecast Flow GL	Total Actual Flow GL	Total Forecast Flow GL	Total Actual Flow GL	Total Forecast Flow GL	
10 Feb	0	27-42	0	1-15	0	0-15	
12 Feb	0	50-70	0	20-40	0	10-30	
14 Feb	0	55-83	0	30-50	0	15-35	
17 Feb	0	56-86	0	30-50	0	15-35	
19 Feb	0	80-135	0	40-80	0	30-60	
21 Feb	0.16	140-170	0	80-110	0	60-80	Northern valley restrictions begin to be permanently lifted – river and floodplain, as 60-70 GL target forecast to be met, even with extraction in these valleys.
24 Feb	24	170-205	0	105-135	0	88-105	
26 Feb	47	260-290	0	170-200	0	150-170	
28 Feb	69	245-275	0	170-200	0	150-170	Restrictions along the Barwon-Darling upstream of Culgoa permanently lifted on 27 February, as these were not contributing significant volumes to meet the target
2 March	105	280-310	0	220-230	0	170-200	

<b>4 March</b>	123	300-330	0	245-275	0	215-240	
<b>6 March</b>	151	315-345	3	235-285	0	205-250	Restrictions along the Barwon-Darling downstream of Culgoa permanently lifted, as these would not impact on meeting the 200 GL target at Menindee
<b>9 March</b>	195	325-355	26	250-300	0	230-285	
<b>11 March</b>	224	355-385	47	270-320	1	250-305	
<b>13 March</b>	254	360-390	72	270-320	25	250-305	
<b>30 March</b>	431	450-470	284	380-415	209	340-390	Last remaining restriction lifted – Barwon-Darling floodplain

## How much water was taken and protected during key periods of the orders?

A list of all the key timeframes for the orders and the periods of pumping approvals or temporary exemptions is provided at Attachment 1.

It is not possible to precisely assess the impacts of the restrictions and pumping exemptions across all the northern basin catchments. Event metering data from the unregulated river catchments is not available. However, we have used a range of approaches to assess the following:

1. How much was taken from the regulated rivers and the outflows to the Barwon-Darling River during February (the key month of the restrictions) and across the February to April 2020 period.
2. How much was taken by supplementary licence holders during February compared to the potential for this take under normal water sharing plan rules.
3. How much was captured in the large on farm storages on the floodplains, including during the 9/10-13 February exemption period.
4. The impact if there had been no restrictions on the unregulated Mooki River and Coxs Creek catchments (in the Namoi Valley) as an example of the unregulated river contributions and impacts.
5. The impact of the restrictions on Barwon-Darling River pumping.

### 1. Extractions and outflows from Northern Regulated River Systems

The department undertook a February and a February-April water balance for the northern valleys of regulated river system inflows, licenced extractions (including extractions under supplementary licences), system replenishments and losses, and outflows to the Barwon-Darling River. This is shown in Table 2 for each regulated river valley - firstly for February 2020 (the key period of the first major flows and the restrictions) and then across the entire February to April period. As all restrictions in the northern valleys were lifted by the end of February, the February to April period highlights the additional extractions that occurred once the restrictions were lifted. The percentages show the volume of extraction, replenishment and outflows as a proportion of the system inflows.

**Table 2: Inflows, take and water remaining in the northern regulated river systems and contributions to the Barwon-Darling**

Water Source	System inflows (ML)	Extractions (ML) ex. Floodplain harvesting	System replenishment (ML)	Outflows (ML)
Border Rivers February	164,000	8,800 (5%) QLD 27,200 (17%)	77,600 (47%)	50,100 (31%)
<b>Border Rivers Total February-April</b>	<b>200,800</b>	<b>9,900 (5%) QLD 27,200 (14%)</b>	<b>71,100 (35%)*</b>	<b>92,500 (46%)</b>
Gwydir February	60,000	5,200 (9%)	16,700 (28%)	38,000 (63%)
<b>Gwydir Total February-April</b>	<b>100,800</b>	<b>17,900 (18%)</b>	<b>30,700 (30%)</b>	<b>52,200 (52%)</b>
Namoi February	122,000	3,700 (3%)	42,300 (35%)	76,100 (62%)
<b>Namoi Total February-April</b>	<b>138,932</b>	<b>10,900 (8%)</b>	<b>26,000 (19%)*</b>	<b>96,100 (72%)</b>
Macquarie February	76,000	13,100 (17%)	62,300 (82%)	600 (1%)
<b>Macquarie Total February-April</b>	<b>235,100</b>	<b>30,800 (13%)</b>	<b>187,800 (80%)</b>	<b>16,500 (7%)</b>

<b>TOTAL February</b>	422,000	<b>31,000 NSW</b> <b>27,000 Qld Border Rivers</b>	<b>198,900</b>	<b>164,000</b>
<b>TOTAL Feb – April</b>	669,500	<b>96,700</b> <b>(incl 27,000 Qld)</b>	<b>315,600</b>	<b>257,300</b>

*\*The system replenishment figures for the February to April period for the Border Rivers and Namoi are lower than the February only figure, as this reflects that the water has moved through these river systems and into higher outflows to the Barwon-Darling.*

The results show that the take by regulated river users was limited during February to about 13.7% of overall inflows. Most flows in the regulated rivers contributed to replenishment of the valley systems and to providing flows to the Barwon-Darling. Note: that almost half of the total volume taken in February was from Queensland pumpers in the Border Rivers who were not subject to restrictions.

Town, domestic and stock supplies, and basic landholder rights in NSW were not subject to the orders as the aim was to replenish supplies for these users. In some valleys, high security and some general security access was permitted in NSW (mainly towards the end of February).

Notwithstanding floodplain harvesting capture, (which is included in the figures in Table 4), by far the largest component of the NSW regulated river extractions during February was supplementary access. This was permitted in sections of the regulated river valleys on 14-16 February in the Gwydir, and from 20 February onwards (Macquarie from 20 February, Border Rivers and Namoi from 25 February and Gwydir from 26 February). Supplementary access in NSW for **consumptive** purposes accounted for 27,200 ML of the 31,000 ML of NSW extraction in February or 88%.

## 2. How much was taken by supplementary access during the restriction period in February

The information provided by the water balance highlights the impact of supplementary access can be on total extractions during first flush flows. Table 3 provides an assessment of actual supplementary access in February, compared with how much potentially could have been accessed if full supplementary access under normal water sharing plan rules had been permitted.

The decision to allow supplementary access included an assessment of the impact of take on downstream targets used for the event, as well as against the targets in the Interim North West Unregulated Flow Plan and the rules in the water sharing plan.

Supplementary access was permitted in certain sections of the rivers for limited periods in February, as this access would not materially impact on the volume of flow reaching the Barwon-Darling. Access was permitted in sections of the Gwydir between 14-16 February, and in sections of the Macquarie from 20 to 23 February, and then more broadly in the Border Rivers, Namoi, Peel and Gwydir from 25 February when other restrictions on river pumping has been permanently lifted. Supplementary access in the Macquarie was not permitted again until 5 April following a request for at least 30 GL to enter the Macquarie Marshes before further access was announced.

**Table 3: Supplementary actual and potential take for February events**

Valley	February event access (ML)	WSP rules potential (ML)	% of potential
Border Rivers <sup>10</sup>	8,700	35,000	25%
Gwydir	7,200*	25,000	29%
Namoi	2,400	57,000	4%
Macquarie	13,600*	15,000	91%
<b>Total</b>	<b>31,900</b>	<b>132,000</b>	<b>24%</b>

\*includes supplementary access by environmental water licence holders. This amounts to a total of 4,700 ML in the Gwydir and Macquarie Valleys – although this water remained in the river and was not extracted.

While the difference between what would have been extracted and the recorded extracted volume is in the order of 100,000 ML, not all of this water would have made it to the Barwon-Darling, especially in the Border, Gwydir and Macquarie systems. Channel capacity in these systems impacts flows and results in water breaking out on to the floodplain increasing system losses. The water sharing plan rules around these systems aim to enable extraction of water above channel capacity. While some of the water that leaves the river will return, significant losses will occur when the water breaks out of the river.

### 3. How much was captured in the large on-farm storages on the floodplains, including during the February exemption period

The order restricting floodplain take in the Macintyre (Border Rivers), Barwon-Darling, Gwydir, Macquarie (Narromine to Oxley Station), the Upper, Mid (Narrabri to Wee Waa) and Lower Namoi and Barwon-Darling floodplains came into place on 7 February. The Lower Macintyre and Lower Macquarie floodplains were added to the order on 12 February.

A temporary exemption was provided in parts of the Gwydir floodplain on 9 to 12 February and also in parts of the Barwon-Darling, Lower Namoi and Gwydir floodplains (an area encompassing Pian Creek, Lower Namoi, Baradine Creek, Mehi River, Barwon River and Thalaba Creek) between 10-13 February because of reports on infrastructure damage resulting from very intense and localised rainfall and stormwater. During the event, there were reports that over 250 mm of rain had fallen in some areas the Lower Namoi and Lower Gwydir. This resulted in large volumes of stormwater on the floodplains and flash flooding. Flows from the Mehi were also backing up due to high flows in the Barwon Darling.

At that time the department assessed that local critical needs had been met and that a short-term lifting to allow landholders to move water around on their properties to reduce infrastructure damage was unlikely to materially impact downstream targets along the Barwon-Darling. There has been a strong interest in how much stormwater was captured in these floodplain areas during the 4-5 day temporary exemptions.

On 21 February restrictions were permanently lifted for Gwydir Valley Floodplain, Narromine to Oxley Station Floodplain, Upper Namoi Valley Floodplain and Lower Macquarie Valley Floodplain. Peak flows had moved out of these floodplain areas, and continued contributions of floodplain

water to river flows in these areas were no longer included in flow forecasts to meet target volumes in Menindee Lakes.

On 23 February restrictions were also permanently lifted in the Lower Namoi Valley Floodplain, Narrabri – Wee Waa Floodplain and Lower Macintyre River Floodplain following intensive rainfall and increased flows over previous 24 hours from Queensland. The forecast flows meant that access could be permitted without jeopardising the 60-70 GL target at Menindee Lakes.

The department used a combination of satellite and aerial survey data and analysis to estimate the volume of water in large on-farm storages in the Northern Basin floodplains at the start of the restrictions, during mid-February when a temporary exemption was provided, and for the full period February-April 2020. These storages capture floodplain water, but are also used to store water pumped from the river, including supplementary access water and groundwater. Therefore, storage increases shown in Table 4 do not solely represent floodplain harvesting. It should also be noted that estimates were based on observable water surface area changes in cloud free imagery and further constrained to storages with a capacity curve developed (that is some 90% of storages). In valleys such as the Barwon-Darling there are other large storages that may not have been captured in the data.

**Table 4: Estimated total volume for on-farm storages on the floodplains**

Floodplains#	Estimated total volume for combined storages (ML)			
	Pre February	Mid-February	Volume increase pre to mid event	End of April
Macintyre	2,200	cloud affected (2,200)	N/A	26,900
Gwydir*	6,800	18,700	+11,900	63,300
Upper Namoi	3,100	5,200	+2,100	11,100
Lower Namoi	9,800	24,500	+14,700	47,400
Barwon Darling	100	400	+300	94,400
Macquarie	922	cloud affected	N/A	48,600
<b>Total</b>	<b>22,900</b>	<b>51,000</b>	<b>+29,000</b>	<b>291,700</b>

This shows that the total volume in the storages increased by some 270 GL from before February to the end of April. About 29 GL of the increase occurred in mid-February and, of this, 27 GL occurred during the temporary floodplain harvesting exemption in parts of the Gwydir, Lower Namoi and Barwon-Darling floodplains.

### 4. The impact on downstream flows of the restriction exemptions for the Mooki River and Coxs Creek unregulated rivers

WaterNSW engaged a consultant to review the modelling undertaken to forecast inflows in the Northern NSW tributaries and into the Barwon-Darling to Menindee Lakes. As part of this review the department also requested that an assessment be made of the impacts that pumping may have had on event volumes in the Mooki River and Coxs unregulated tributaries of the Namoi River.

The order on the unregulated river catchments came into effect on 17 January. Unregulated river access licence holders in the Mooki River were allowed to pump via a temporary exemption from 26 January to 7 February because the high flows in the river were connecting with the Namoi River, but were not expected to contribute to downstream targets, regardless of whether pumping was allowed. From 8 to 17 February a further pumping exemption was provided for the Mooki River, and a similar exemption was approved for Coxs Creek and a number of other Namoi unregulated rivers. Restrictions on pumping were permanently lifted for all Namoi unregulated rivers on 21 February.

Therefore, over February there were 24-25 days when the Mooki unregulated river licence holders could pump (and only 3-4 days when they couldn't) and 10 days when the Coxs Creek licence holders could pump.

The assessment of potential pumping found that during February:

- The Mooki River contributed around 17% of volume to the Namoi flows at Gunnedah.
- Both the Mooki River and Coxs Creek contributed around 40% of flows in the Namoi at Boggabri.
- At the Namoi end of system, pumping from the Mooki River and Coxs Creek reduced event volume in the order of 21%.
- If the Mooki and Coxs Creek licence holders were allowed to pump from the 17th to the 20th of February, the Namoi end of system event volume would have been reduced by approximately another 2%.
- In the Barwon-Darling at Wilcannia, extractions from the Mooki River and Coxs Creek reduced the NSW portion of the flushing event volume by approximately 5.3% and the total event volume by 3.8%.
- If the Mooki River and Coxs Creek licence holders were allowed to pump from the 17th to the 20th of February, the event volume at Wilcannia would have been reduced by less than another 1% for both the NSW portion of the event and the total event volume.
- The volume reductions at Wilcannia are indicative of the likely reductions at Menindee.

### 5. The impact of the restrictions on Barwon-Darling River pumping

The order applied to the Barwon-Darling River pumpers from day 1 (the 17 January) and continued without any exemptions until restrictions were lifted in the section upstream of Culgoa on 27 February. Restrictions were lifted for the rest of the Barwon-Darling River downstream on 6 March. Restrictions on Barwon-Darling floodplain take were not permanently lifted until 31 March until at least 200 GL had entered Menindee Lakes.

Flows started in the Barwon-Darling River from around 26 January at Mogil Mogil and 6 February at Collarenabri. WaterNSW has estimated that with no restrictions up to 46 GL could have been extracted by A, B and C pumpers in the upper section of the Barwon-Darling to Culgoa during the period 17 January to 27 February. However, if access in the northern tributaries had also not been restricted, the pumping triggers in the Barwon-Darling may have been met less often.

For the section downstream of Culgoa to the Menindee Lakes, the river started flowing at Bourke on 20 February and access would have been triggered from 21 February without the restrictions. WaterNSW has assessed that without the restrictions, an additional 25 GL could have been extracted in this section.

Meter reading is nearing completion for licence holders along the Barwon-Darling and the final results are not yet available. However, 212 GL is a preliminary assessment of extractions up to the end of 30 June 2020. Meters are only read once per year so the estimate is for the full 12 months. Other than extractions for town, domestic and stock and basic landholder rights, it can be assumed that this represents most of the extraction that occurred after the restrictions were lifted on A, B and C access from 27 February upstream of Culgoa and after 6 March for downstream of Culgoa. Most access ceased during May, although there were some small events where A class access would have been available in June.

## Key points and next steps

The Northern Basin restrictions were the first time the department had applied such widespread restrictions across regulated rivers, unregulated rivers and floodplain harvesting access. This was considered necessary given the exceptional drought conditions being experienced. Except for the regulated rivers, there is limited information available to assess the impact of extractions in real time. The department relied on a series of target flows along the main rivers and the forecasting of flows by WaterNSW. Over the next few years, data availability will improve as the metering program is rolled out across the state and floodplain harvesting is licensed and measured. Further information on the roll out of [metering framework](#) in NSW and for the [floodplain harvesting program](#) can be found on the department's website.

The restrictions achieved the main objectives of providing connectivity through the northern basin to Menindee Lakes and to the Murray River at Wentworth, replenishing town and domestic and stock supplies, which in many cases were all but exhausted, and providing important environmental replenishment. In total the northern regulated river systems received over 300 GL in system replenishment and contributed some 250 GL to the Barwon-Darling by the end of April. Furthermore, by the end of April almost 400 GL had entered Menindee Lakes with flows from NSW and Queensland tributaries.

A responsive management approach allowed commercial access to flows once local critical needs had been met and sufficient flow contributions had been made for downstream needs. Flows and forecasts were assessed daily and access provided as soon as possible. The first rainfall and flows in late January to early February were only predicted to provide a small (if any) volume to Menindee Lakes. However, further rainfall over February in the northern catchments, plus contributions from subsequent rainfall in the Queensland catchments, meant that by 21 February it was predicted that the flows could make a real difference to restoring flows to the Lower Darling.

It is important to consider the outcomes of the restrictions, as the event unfolded, rather than just examine total water balances at the end of the event. In the early stages of the event most of the rainfall had fallen in northern inland NSW and early rainfall in Queensland was not forecast to contribute to flows in NSW. At that stage, any earlier lifting of restrictions would have impacted on the ability to meet the flow target in Menindee Lakes.

The assessment of the event highlights the extent to which supplementary access and floodplain capture could account for large diversions after a drought period. Contributions from unregulated river catchments can also be significant to both overall valley flows and Barwon-Darling inflows, as shown in the Mooki River and Cocks Creek example.

The department is now completing an assessment of the extent to which the targets were met and the ecological outcomes. This will inform a review of the targets themselves and the development of a framework for when such restrictions would be applied in the future following prolonged dry conditions. WaterNSW is also reviewing its models and flow forecast predictions.

In addition to responding to the recommendations of the Independent Assessment Panel the department is committed to:

- 1) Developing a communications plan prior to any future event that may require restrictions. Stakeholder input will be sought on the plan.
- 2) Revising the NSW Extreme Events Policy and associated valley incidence response guides so that it is clearer when any future restrictions may be applied and lifted.
- 3) Reviewing the restriction approach so that local conditions can be better considered when managing any future event.

## More information

Click on the links below:

- [Information sheet](#) setting out the targets and principles for the Northern Basin restrictions
- Series of information sheets and the water restrictions orders for the Northern Basin restrictions – available from the [temporary water restriction page](#)
- [Operational updates](#) – WaterNSW regularly published updates on the volumes of flow in the Barwon-Darling and forecasts flows to Menindee Lakes
- [Supplementary Announcements](#) – WaterNSW publishes supplementary access announcements on its website
- [Macquarie Marshes Drought Recovery](#) – information sheet outlining the delay in allowing further supplementary access in the Lower Macquarie until 5 April
- [Independent Assessment Panel First Flush](#) – link to website and draft report published on 13 July 2020
- [Assessment of take and protection during first flush flows in the Northern Basin](#) – technical report
- [North–West Flows](#) webpage - includes information about the benefits of the restrictions

## Attachment 1

### Key timelines and actions

Date	Information/Action
12 January 2020	<p><b>BOM forecast</b></p> <p>The Bureau of Meteorology forecast widespread rain for the east of Australia from 16 January. The low-pressure trough was expected to develop over central to western NSW. The trough was forecast to be slow moving and continue over a four-day period with potential rainfall totals of 30 – 80 mm over this period.</p>
15 January 2020	<p><b>Valley targets</b></p> <p>As a basis for determining the critical volumes that would need to be protected before access could be permitted, the department developed a series of volumetric flow targets for points along the northern valleys and the Barwon-Darling River.</p>
17 January	<p><b>First Order gazetted</b></p> <p>The Northern Basin temporary water restriction was gazetted covering unregulated and regulated river access across the northern valleys and the Barwon-Darling. The order applied initially until 31 January.</p>
20 and 23 January	<p><b>Area excluded from the Order</b></p> <p>Permanent exemptions were provided to river pumpers in the Bathurst region in the Upper Macquarie as they were already subject to pumping restrictions which had applied since October 2019 to protect Bathurst's town water supply.</p>
26 January to 7 February	<p><b>Temporary exemption</b></p> <p>Peel high security regulated river and Mooki River and Quirindi Creek unregulated river access licences were given an exemption and allowed to pump. Flows were sufficient to allow access in these areas and to reconnect the Peel and the Mooki Rivers to the Namoi River. Further downstream targets were not expected to be met, regardless of extraction. Peel high security users had been substantially restricted from accessing flows since regulated releases had ceased at Dungowan to conserve water for Tamworth in December 2019. The exemption initially applied to 31 January and was then extended to 7 February.</p>
30 January	<p><b>First Order extended</b></p> <p>With further rainfall and flows forecast, the order was extended for river pumping from the northern and Barwon-Darling valleys to 17 February.</p>

7 February	<p><b>Second Order gazetted covering floodplain harvesting</b></p> <p>Order applying to the following six floodplains commenced and applied to the 28 February:</p> <ul style="list-style-type: none"> <li>• Barwon-Darling Valley Floodplain</li> <li>• Gwydir Valley Floodplain</li> <li>• Lower Namoi Valley Floodplain</li> <li>• Narrabri – Wee Waa Floodplain (mid Namoi)</li> <li>• Narromine to Oxley Station Floodplain (Macquarie)</li> <li>• Upper Namoi Valley Floodplain</li> </ul>
8 to 17 February	<p><b>Temporary exemption</b></p> <p>High rainfall in the Namoi Valley and Lower Gwydir allowed unregulated river access in some sources as it was considered that the take would not materially impact on flows into the Barwon Darling.</p> <p>Namoi Unregulated water sources were: Upper Macdonald River Water Source, Mid Macdonald River Water Source, Upper Namoi Water Source, Werris Creek Water Source, Rangira Creek Water Source, Bluevale Water Source, Coxs Creek Water Source, Maules Creek Water Source, Eulah Creek Water Source, Bohena Creek Water Source, Spring and Bobbiwaa Creeks Water Source, Phillips Creek Water Source, Mooki River Water Source, Quirindi Creek Water Source, Warrah Creek Water Source.</p> <p>Gwydir Unregulated water sources: - Thalaba Creek Water Source - Millie Creek Water Source</p>
9 to 12 February	<p><b>Temporary exemption</b></p> <p>Pumping permitted from the Mehi River (at the end of the Gwydir system). For 2 days there had been in excess of 250 mm of rain in lower Gwydir. Flows in the Mehi River were at 4,000 megalitres (ML)/day and 4,500 ML/day in Moomim. Flows from the Mehi were backing up due to high flows in the Barwon-Darling. The main intent of lifting this order was to minimise flood impacts, and allow farmers to move water around their property.</p>
9 to 17 February	<p><b>Temporary exemption</b></p> <p>Access permitted for high security users in the Peel, Upper Namoi and Lower Namoi. It was estimated that high security take would be in the order of up to 150 ML/day, 3 ML/day, and 0.2 ML/day in the Namoi, Peel, and upper Namoi respectively. At the time of this decision, flows in the Namoi were 10,000 ML day at Gunnedah and 14,000 ML day at Narrabri (and rising). These were well in excess of the flow targets to achieve high priority needs. The impact of allowing high security take was insignificant when considered against the flows and would have no material impact on flow targets.</p>
9 to 17 February	<p><b>Temporary exemption</b></p>

	<p>Access permitted in some Namoi unregulated river water sources: Brigalow, Bundock, Coghill, Etoo and Talluba, lower Namoi, Pian, and Baradine. Over 2 days there had been in excess of 250mm of rain in lower Gwydir, lower and mid Namoi. Flows in the Namoi River had exceeded (or were forecast to exceed) all targets. All flow targets had been met in the Namoi Valley and it was expected that targets at Brewarrina and Bourke would also be met in the Barwon-Darling. Unregulated access take from these water sources would not pose a material risk to further flows down the Barwon-Darling.</p>
9/10 to 13 February	<p><b>Temporary exemption</b></p> <p>Take permitted initially from 9-12 February for the Thalaba and Mehi water sources on the Gwydir Floodplain. On 10 February this exemption was extended for these water sources on the Gwydir floodplain until 13 February and also included the Barwon section.</p> <p>Specified sections of the Lower Namoi and Barwon-Darling floodplains were also included in the 10 –13 February exemption. There had been in excess of 250 mm of rain in some locations across the Namoi and lower Gwydir resulting in large volumes of overland flow on the floodplains and flash flooding. Flows from the Mehi had been backing up due to high flows in the Barwon-Darling. The main intent of the exemptions was to minimise flood impacts and as a result of reports of infrastructure damage to allow farmers to move water around their property to avoid further damage.</p>
12 February	<p><b>Floodplain Order amended</b></p> <p>Order for floodplains amended to include two additional floodplains - Lower Macintyre River Floodplain and the Lower Macquarie Valley Floodplain</p>
12-17 February	<p><b>Temporary exemption</b></p> <p>Access permitted in the unregulated Yarraman Creek within Lake Goran Water Source as an intensive rainfall event occurred in Yarraman Creek. This resulted in very high localised flows and flash flooding. Yarraman Creek is a terminal system and the take of water would not materially impact on flows.</p>
13 February	<p><b>First Order final extension</b></p> <p>Order on river pumping in the northern valleys extended to 28 February and permanently removed restriction on access by high security users in Peel, Lower Namoi and Upper Namoi from the order.</p>
17 February	<p><b>Restriction lifted</b></p> <p>Restrictions on access by Border Rivers high security users were lifted. There had been significant flows into the Border Rivers since 10 February. While the Border River flows would contribute to flow in the Barwon-Darling, the material impact of permitting access by high security licence holders was minimal. Allowing high security access from uncontrolled flows would also</p>

	allow inflows to upstream dams to be retained for future critical water needs in the Border Rivers regulated river water source.
18 February	<p><b>Restriction lifted</b></p> <p>Restrictions on access in Yarraman Creek lifted as a result of a further intensive rainfall event on 17th February 2020.</p>
20 February	<p><b>Menindee Lakes target</b></p> <p>Because of further rainfall, WaterNSW forecast that 60-80 GL could reach Menindee if restrictions remained. A volume of 60 – 70 GL into Menindee Lakes would enable a release of water along the full length of the Lower Darling River to Wentworth of 20 GL, with an additional 40 GL providing a water supply reserve for the township of Menindee and a drought refuge if dry conditions return. A 60-70 GL target for Menindee Lakes was adopted.</p>
21 February	<p><b>Restriction lifted</b></p> <p>Restrictions on all unregulated river access in the NSW Border Rivers, Gwydir, Namoi, Macquarie Bogan, Peel and Castlereagh Valleys were permanently lifted. Flows were expected to meet critical needs along the full length of the Barwon-Darling River and the target of 60-70 GL in Menindee Lakes. Peak flows had moved out of these unregulated tributaries and were no longer included in flow forecasts to meet target volumes in Menindee Lakes.</p>
21 February	<p><b>Restriction lifted</b></p> <p>Restrictions were permanently lifted for Gwydir Valley Floodplain, Narromine to Oxley Station Floodplain, Upper Namoi Valley Floodplain and Lower Macquarie Valley Floodplain. Peak flows had now moved out of these floodplain areas and continued contributions of floodplain water to river flows in these areas were no longer included in flow forecasts to meet target volumes in Menindee Lakes.</p>
23 February	<p><b>Restriction lifted</b></p> <p>Restrictions were permanently lifted in the Lower Namoi Valley Floodplain, Narrabri – Wee Waa Floodplain and Lower Macintyre River. Floodplain following intensive rainfall and increased flows over previous 24 hours from Queensland, the forecast flows which meant that access in these water sources could be permitted without jeopardising the 60-70 GL target in Menindee Lakes.</p>
23 February	<p><b>Restriction lifted</b></p> <p>Restriction was permanently lifted to allow general security users to access remaining small volume of water in general security accounts from run of the river flows. Access would not impact on target flows to Menindee Lakes and would conserve water in major dams.</p>

25 February	<p><b>Restriction lifted</b></p> <p>Suspension of general security account water lifted to enable general security users in the Border Rivers, Upper Namoi and Lower Namoi to access limited volumes in suspended carryover accounts from run of the river flows. Access would not impact on target flows to Menindee Lakes and would conserve water in major dams.</p>
27 February	<p><b>Restriction lifted</b></p> <p>Restrictions were permanently lifted on A, B and C class pumpers on the Barwon-Darling Upstream of the Culgoa Junction as inflows from the Culgoa River system meant that forecast flows for the Barwon-Darling would exceed the target of 60-70 GL at Menindee Lakes. Access in this section would not impact on target flows to Menindee Lakes.</p>
29 February	<p><b>Third Order gazetted:</b></p> <p>New order gazetted applying to A, B and C Class unregulated river access licences in the Barwon-Darling downstream of Culgoa Junction and to floodplain harvesting in the Barwon-Darling Floodplain. This order applied to 17 April. This restriction was required to protect the flows as they made their way down the Barwon-Darling to Lake Wetherell. The peak flows were forecast at that time to pass into Lake Wetherell by end of March/mid-April.</p>
4 March	<p><b>Revised Menindee Lakes target</b></p> <p>WaterNSW was forecasting over 200 GL of flows could reach Menindee Lakes. 200 GL was subsequently adopted as the new target for Menindee Lakes as this would provide at least 12 months' supply for the Lower Darling.</p>
6 March	<p><b>Restriction lifted</b></p> <p>Restrictions were permanently lifted on unregulated river access licences downstream of the Culgoa Junction in the Barwon-Darling. Following further rainfall and flows in the Barwon-Darling on 4-5 March and increased flows forecast to arrive from Queensland, inflows were now forecast to exceed 200 GL at Lake Wetherell even with pumping along the Barwon -Darling.</p>
10 March	<p><b>Flows reach Menindee Lakes</b></p> <p>Flows began entering Menindee Lakes with some 60 GL arriving by 16 March.</p>
26 March	<p><b>Lower Darling releases commence</b></p> <p>Some 190 GL had arrived in Menindee Lakes and releases commenced into the Lower Darling.</p>
31 March	<p><b>Restriction lifted</b></p> <p>Restrictions were permanently lifted on Barwon-Darling floodplain take as more than 200 GL had entered Menindee Lakes.</p>

