

Draft Report

Independent Panel Assessment of the Management
of the 2020 Northern Basin First Flush Event

July 2020

Acknowledgement of the Traditional Owners of the Murray–Darling Basin

The Independent Panel acknowledges and pays respect to the Traditional Owners and their Nations of the Murray–Darling Basin who have a deep cultural, social, environmental, spiritual and economic connection to their lands and waters.

The Panel appreciates the need for recognition of Traditional Owner knowledge and cultural values in natural resource management associated with the Basin.

Other acknowledgements

The Independent Panel would like to acknowledge the contributions of and thank all of the people who have dedicated their time and efforts into assisting the Panel to develop this draft report. This includes:

- staff of all of the NSW, Commonwealth, Victorian and Queensland agencies for their time, cooperation and frankness in interviews with the Panel,
- members of the public who took the time to complete a survey and prepare written submissions as part of the initial public consultation undertaken for this draft report,
- members of the Water User Reference Group who shared both their time and valuable insights with the Panel throughout this process, and
- Jacyleen Ong and Susan Macolino, who provided wonderful and diligent assistance to the Independent Panel throughout the assessment and in the preparation of this draft report.

Glossary

BoM	Commonwealth Bureau of Meteorology
CEWH	Commonwealth Environmental Water Holder
CEWO	Commonwealth Environmental Water Office
DNRME	Queensland Department of Resources, Mines and Energy
DPIE	New South Wales Department of Planning, Industry & Environment
DPIE Water	New South Wales Department of Planning, Industry and Environment – Water
DPIE-EES	New South Wales Department of Planning, Industry and Environment – Energy, Environment and Science
FPH Policy	New South Wales Government Floodplain Harvesting Policy 2013
GL	gigalitres
IRG	Incident Response Guide
MDBA	Murray Darling Basin Authority
ML	megalitres
NRAR	New South Wales Natural Resources Access Regulator
SES	New South Wales State Emergency Services
WM Act	<i>Water Management Act 2000 (NSW)</i>
WNSW	WaterNSW

Contents

Executive summary	1
Key Findings	1
Recommendations	4
1. Introduction	8
1.1 Preamble	8
1.2 Background to this Independent Assessment	9
1.3 Terms of reference	9
2. Assessment approach	10
2.1 Process to prepare this draft report	10
Interviews	10
Water User Reference Group	10
Public consultation	11
2.2 Current situation	11
3. Legislative and regulatory context	12
3.1 Overview of NSW regulatory framework for water management	12
3.2 NSW regulatory framework for water management in circumstances of drought	13
3.3 Agencies involved in the management of water in NSW	15
4. Lead up to the 2020 Northern Basin First Flush Event	17
4.1 Climate conditions until December 2019	17
4.2 Independent assessments of NSW Water Management	19
4.3 Floodplain Harvesting Policy	21
4.4 Review of NSW Water Sharing Plans and preparation of water resource plans	21
4.5 Development of Long Term Water Plans	23
4.6 Use of temporary water restrictions to manage “First Flushes” prior to the 2020 event	23
Northern Basin connectivity event (April 2018)	23
April 2019 event	24
Northern Fish Flow (April - June 2019)	25
4.7 Preparation of the Floodplain Harvesting Exemption	26
4.8 January 2020 rainfall, temporary water restrictions and preparation to commence the floodplain harvesting exemption	26
5. Preparation for the first flush event	27
5.1 Steps taken to prepare for the first flush event	27
The proposal for a pre-emptive restriction	27
Adoption of adaptive management provisions in section 324 orders	28
Determining the Needs of the Environment During an Extreme Event (the NEDEE project)	28
Other targets to meet water supply for critical needs	30
Principles determining the lifting of restrictions	30

Putting the NEDEE work and adaptive management provisions into practice	30
5.2 Communication and engagement in preparation for the first flush event	31
5.3 Preparation for the floodplain harvesting exemption and the floodplain harvesting restriction	32
5.4 Communication and engagement in preparing for the floodplain harvesting exemption and floodplain harvesting restrictions	33
6. Management of the 2020 Northern Basin First Flush Event	33
6.1 What had to be managed?	33
The beginning of the event in February 2020	33
Rainfall across the Northern Basin through to May 2020	34
6.2 Who was involved?	35
6.3 How did they manage the event?	36
The temporary water restrictions and active management provisions	36
Overview of the WaterNSW modelling and forecasting	38
Difficulties in forecasting Queensland flows into NSW	39
NSW water extraction data	39
Floodplain harvesting data	40
Flow behaviour, including during extreme events	40
6.4 Unexpected developments during the event	41
The temporary lifts of restrictions on Floodplain Harvesting	41
Adoption of Menindee Lakes Targets	43
Supplementary Water Announcements	43
6.5 Communications throughout and following the event	44
Communicating notice of the making and lifting of restrictions	44
Use of the Early Warning Network	45
Information available on the DPIE Water and WaterNSW websites	46
Point of contact for enquiries during the event	46
Communication with other government agencies throughout the event	47
Development of communications throughout the event	47
Public feedback on communications	47
Communications regarding floodplain harvesting when the regulation and restriction commenced	48
Communication of the objectives, targets and principles of managing the first flush event	48
Communications following the event	49
7. Findings in relation to management of the event	49
7.1 Preliminary	49
7.2 Adequacy of planning for the event	51
7.3 The objectives, targets and principles	52
7.4 Roles and responsibilities in decision making	54

7.5	Evidence relied upon in decision-making	54
7.6	Communications after the event	55
8.	How management of the event satisfied NSW Government responses to prior independent investigations into NSW water management	55
8.1	The Matthews Inquiry	55
8.2	Extent to which management of the event was consistent with the Government's response to the Matthews Inquiry	57
	Introduce best practice management for water	57
	Build a compliance and enforcement regime that ensures strong and certain regulation	57
	Ensure transparency in how we share, allocate and manage water	57
8.3	The Vertessy assessment and report	58
8.4	The NRC Review	59
8.5	The Government's response to the Vertessy report and NRC Review	60
8.6	Extent to which management of the event was consistent with the Government's response to the Vertessy report and NRC review	60
9.	Appropriateness of the use of section 324 orders to manage first flush events	61
10.	Recommendations	63
	Next steps	72
	Appendix A – Terms of Reference	73
	Appendix B – Panel Member Biographies	75
	Appendix C – Government Responses to Matthews Inquiry, Vertessy Report and NRC Review	76
	Appendix D – Flowcharts of temporary water restriction processes	81
	Appendix E – Proposal for the proactive temporary water restriction	84
	Appendix F – Flow Targets for the 2020 Northern Basin First Flush Event	86
	Appendix G – Decision Tree for Northern Valleys Flow Event	91
	Appendix H – Bureau of Meteorology Forecasts	92
	Appendix I – Chronology of decisions and communications	94
	Appendix J – NRAR Observation Flight Report	108

Executive summary

In March 2020, the NSW Government commissioned an independent assessment into the management of the 2020 Northern Basin First Flush event following the 2018-2019 drought in the Northern Murray-Darling Basin.

The objectives of this assessment are to:

1. Provide transparency about the decision-making processes that were used to manage the event under the [Water Management Act 2000 \(NSW\)](#).
2. Recommend strategies to improve the management of first flush events under the *Water Management Act 2000* (WM Act) in the future, including:
 - a. system and process changes which would improve the management of a first flush event by Department of Planning, Industry and Environment – Water (DPIE Water), the Natural Resources Access Regulator (NRAR) and WaterNSW, and
 - b. regulatory, planning or policy changes (including to relevant water sharing plans) which would improve the management of a first flush event.

An Independent Panel, consisting of Dr Wendy Craik and Greg Claydon, was appointed to review the actions undertaken, consult with affected water users and communities, and report on how systems and processes, and transparency in water management, could be improved in relation to first flush events.

This draft report from that assessment sets out the Panel's key findings and recommendations based on a review of documents, discussions with government agencies and key stakeholders, and public feedback provided through surveys and written submissions to date.

Further public feedback will be sought on this report prior to its finalisation.

Key Findings

When the 2020 Northern Basin First Flush event began, environmental systems were under severe stress due to record drought conditions. Since mid-2017, there had been only one period when rainfall produced any significant inflow into the Northern Basin of the Murray-Darling Basin. In 2019, the only source of inflows into some sections of the Barwon-Darling river had come from releases of held environmental water. Individuals and communities from the north to the south were also under severe financial, emotional, cultural and physical distress.

When rain did finally fall in early 2020, it did not do so in a single event. The 2020 Northern Basin First Flush event was the product of a number of rainfall and flow events in many locations, in a large and complex basin. Further, real-time management of uncontrolled flows to provide for critical water needs throughout the Basin, is a relatively new approach to managing water for the NSW Government, and this event was the largest event where real time management has been applied. The event also took place at a time when a number of key water planning and management reforms essential to enabling effective real time management are still being implemented, and while the information and understanding of high and low flows, and extractions and flow behaviour on floodplains, is limited.

The use of discretionary section 324 temporary water restrictions (also known as embargoes) under the provisions of the WM Act to protect these first critical inflows demonstrated the commitment of the NSW Government to protect and restore water for the environment. Ultimately, the 2020 Northern Basin First Flush event led to some wonderful and much needed outcomes for communities in need.

Water supplies were secured for Goondiwindi, Boggabilla, Mungindi, Collarenebri, Walgett, Brewarrina, Bourke, Wilcannia, Menindee, Sunset Strip and Pooncarie. Menindee Lakes received enough water to enable a pulse release which re-started the river without fish kills or blue-green algae outbreaks. Thousands of kilometres of rivers flowed for the first time in many months and the Barwon-Darling was reconnected with its tributaries. It enabled fish and other aquatic animals to move up and down significant lengths of the rivers and catchments in the Northern Basin have shown improvements in water quality

Unfortunately, however, the positive outcomes of the event have largely been overshadowed by an overriding perception across communities and water users that the event was poorly managed, leading to lost opportunities that cannot be regained, from social, cultural, economic and environmental perspectives alike. Management of the 2020 Northern Basin First Flush event was also substantially complicated by floodplain harvesting issues. At the beginning of the event, a regulation was introduced which, for the first time, exempted the need for certain floodplain harvesting to be licenced. On the same day, a temporary water restriction was made which, for the first time, prohibited the take of water via floodplain harvesting.

The Panel recognises that it is easy to judge another's actions with the benefit of perfect information that was not available at the time. However, the actions and decisions associated with the 2020 Northern Basin First Flush event have to be judged by reference to the information that was available to decision makers at the time they were being made. The Panel's task in undertaking this assessment was not to scrutinise each decision (and there were many), or the accuracy of each target used in managing the event. The task of this assessment was to review the systems and processes underpinning the management of the event to identify where improvements can be made.

As a whole, the Panel is of the view that agency officers had reasonable internal decision-making processes in place, and did a relatively good job of ensuring critical human and environmental water needs were met across the whole of the Northern Basin in NSW, based on the information and resources they had at the time. They also demonstrated great focus, courage, tenacity and determination in their efforts to manage what was a very dynamic, complex and imperfect situation.

Despite the positive outcomes for critical human and environmental water needs in this event, some improvements are required to the decision-making framework. Not all elements were quantified (for example, cultural flows, stock and domestic requirements, harvestable rights and town water supplies) and greater rigour could be applied to the decision-making framework. The evidence base had some shortfalls (for example, there was limited data regarding unregulated and floodplain flows and extractions, flows entering NSW from Queensland, and the impacts of extractions and extremely dry conditions on river flows). The extent of connectivity being sought in the river system was not always clear, and some decisions lacked the requisite local knowledge or expertise, which was of concern to the community. Nevertheless, there was strong internal clarity of roles and responsibilities between the agencies, which worked collaboratively together and showed great dedication and commitment, and mutual support of colleagues in their attempt to manage the event under sometimes very stressful conditions.

Ultimately though, insufficient planning and preparation was undertaken for the 2020 Northern Basin First Flush event - most significantly, in regard to not informing and engaging water users and the community when preparing the objectives, targets and principles, not preparing water users and the community for the first flush event, and not developing adequate incident management arrangements. Floodplain harvesting, and how this would be incorporated into the management framework, was not taken into account in any substantial way. Nor was any information provided to stakeholders (in particular floodplain harvesters) about its treatment in a first flush event. While WaterNSW has some incident management capabilities associated with flood incidents, those systems were not applied to the 2020 Northern Basin First Flush event.

NSW made substantial efforts to use the best available information to make decisions, but there were some significant data gaps relating to flows out of Queensland, floodplain harvesting and flow data, channel capacity and allowances for water to move to downstream locations. The dynamic nature of the event, coupled with inadequate incident management preparedness, meant that local scale insights, needs, demands and impacts did not factor into decision making as they ideally would. While the decision-making framework met statutory requirements for making temporary water restrictions under section 324 of the WM Act, the decision-making process was opaque. The community was not clear on who was doing what, or why, which led to communication and confidence issues, and frustrations. All of this contributed to a lack of trust and a strong perception that the 'goal posts' shifted during the event.

Community levels of trust in NSW water management have been low and in need of rebuilding since the July 2017 Four Corners program "Pumped". Not releasing information prior to the event was a significant shortfall in transparency. Inadequate systems to communicate information during the event made it very difficult for people to have confidence in the integrity of the Government's decisions, and even those with good knowledge of water issues and rules had difficulty following the decisions made during the event.

The lack of clarity denied water users the ability to plan their operations, compounding already high levels of stress and anxiety following the prolonged drought, and it denied indigenous communities the opportunity to celebrate the positive cultural outcomes that were being generated by flows through the river system as the event unfolded.

There remains a strong unmet demand for information about the event. The limited publication of information has allowed speculation about extraction, impacts and outcomes of the event to become de facto truths, and promote perceptions of mistrust, secrecy and mismanagement. It has inhibited a productive, fact-based discussion on the benefits and costs of first flush events.

Given the level of mistrust in water management in NSW, the continued use of section 324 temporary water restriction orders outside of a clear, publicly consulted framework (to manage first flushes) and the absence of information on the outcomes are likely to consistently lead to accusations of favouritism and incompetence. As an alternative to the use of section 324 restriction orders in times of severe droughts, which are expected to increase in frequency and severity with a drying climate, water users and the community have expressed strong support for including details about first flush management arrangements in the WM Act and water sharing plans.

Management of the event demonstrated consistency with the Ken Matthews Inquiry recommendations in the sense that internally, there was clarity of roles and responsibilities between agencies and collaborative relationships between the agencies lifted overall performance during the event. However, this internal clarity did not translate to clarity for water users and communities who did not necessarily have a good understanding of who was doing what, or where a point of contact could be found.

While NRAR compliance investigations related to the temporary water restrictions are ongoing, this event reinforced the need for the agreed reforms to be fully implemented. Both management of the event, as well as compliance and enforcement activities, would have benefited from the pending metering and telemetry reforms. The use of LiDAR remote sensing technology to measure on-farm water storages is also an important development, but further progress is required.

A key finding of the Matthews Inquiry was a need for transparency in water regulation. The Panel is of the view that genuine transparency was not achieved before, during or after the 2020 Northern Basin First Flush event. Information that was available was not necessarily accessible, and there was a lack of communication to water users and the public about the objectives and rationale for water restrictions prior to the event. There was a lack of consultation and public communication regarding both the introduction of the floodplain harvesting regulation and the

floodplain harvesting restriction, and there has not been accessible timely reporting during or after the event. Further, there was no clear framework to ensure equitable access to information for the full range of stakeholders, or a transparent set of engagement arrangements in place before or during the event.

However, management of the 2020 Northern Basin First Flush event did successfully protect water for towns and the environment, consistent with the Government's response to the Vertessy Report and the NRC Review. Two years of water supply was secured for 11 communities across the Northern Basin, Menindee Lakes received 12-18 months of water supply, and sufficient water was protected to restart the Lower Darling River without fish kills, a salinity problem or blue-green algae outbreaks.

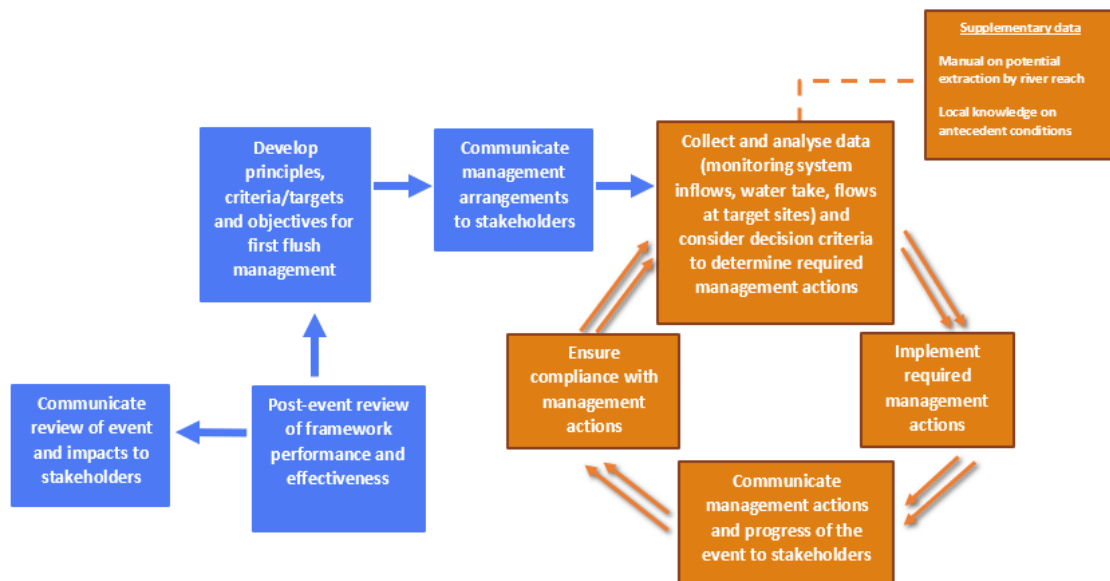
Regrettably, there was an overall failure to engage with indigenous communities in managing this event to ascertain Native Title rights and cultural flow requirements, and to enable communities to enjoy the social and cultural benefits of protecting first flushes. Further, while there was some communication between NSW and Queensland in managing the first flows, there was no formal coordinated approach.

It is vital that reforms continue, not only for reasons of achieving better water management generally, but also because they will help to improve management of future first flush events. Communicating progress with the reform agenda will also help to keep water users and the community informed, with a view to building understanding and trust. All of this will take time and resources, with associated costs and benefits having to be weighed up against other priorities of Government. With the demonstrable positive outcomes possible from first flush events, the Panel considers the time and resources needed to improve their management would be well worthwhile.

Recommendations

Following its assessment, the Panel recommends the NSW Government takes the following steps to improve first flush management in NSW:

1. Ensure that water management provides for and promotes connectivity between water sources.
2. Make any temporary water restrictions required to manage first flush events on a proactive basis (that is, prior to specific forecasts of rain).
3. Until there are further statutory provisions for first flush event management, publish guidance materials which outline how the NSW Government will use temporary water restrictions to manage first flush events.
4. Incorporate learnings from the 2020 Northern Basin First Flush event into systems that will be used to manage any future first flush event that arise in the short term, including by undertaking consultation with communities, Aboriginal people and water users on the objectives, principles and targets. A diagram of the suggested system is set out below. Blue boxes indicate steps to be undertaken outside of the event and orange boxes indicate steps to be undertaken during an event.



5. Take steps to ensure the evidence base and methodology for first flush management is quantified, science-based and made publicly available.
6. Review and update incident management systems for managing first flush events.
7. Embed the management of first flush events in the regulatory and policy framework for managing drought. An example of the types of matters that could be incorporated into the WM Act, Extreme Events Policy, water sharing plans and incident response guides is set out in the table below. However, any framework adopted should be developed in discussion with communities, Aboriginal peoples and water users.

What will be set out?	Rationale	Example
WM Act		
<ul style="list-style-type: none"> Objectives for managing first flush events Requirement for water sharing plans (WSPs) covering the Murray Darling Basin to include rules for first flush management which must provide, to the extent practicable, for: <ul style="list-style-type: none"> connectivity within and between water sources, and the protection of critical needs. 	<p>The objectives for first flushes should be consistent across all areas of the Basin and, given their broad nature, should not change over time. They should also be tied to the existing legal requirements under the WM Act and the Basin Plan.</p>	<p>Objective of first flushes</p> <ul style="list-style-type: none"> meet critical human needs – provide flow locally and downstream, particularly to replenish town water supply weir pools and provide water supply for basic landholder rights meet critical environmental needs – provide flow along the length of the river systems to ensure re-connection of rivers and drought refuge pools.
Extreme Events Policy		
<ul style="list-style-type: none"> Scope to be expanded to explain how water will be managed as intensity of drought reduces, as well as increases Principles for allowing access to flows in first flush events 	<p>The principles for allowing access to flows should be consistent across all areas of the Basin.</p> <p>However, given the level of detail and likely need to adjust these with time and experience, it is not appropriate to embed these in the WM Act at this stage.</p>	<p>Principles</p> <ul style="list-style-type: none"> Consider providing access to upstream water users under normal rules if the nearest downstream targets are met or forecast to be met and there is an assessment that this event will not meaningfully contribute to meeting any other downstream targets. Where an event is predicted to meaningfully contribute to meeting the next downstream target, the temporary water restriction should not be lifted When an event has met local targets and is no longer expected to contribute to meeting downstream targets or is in excess of that required to meet downstream targets, some local extraction relief could be allowed. Temporary water restrictions should apply to a consistent upstream network of both unregulated and regulated

		<p>rivers systems in a valley, to provide sufficient volumes of water to meet critical needs, avoid interceptions by extractors, and avoid inequitable sharing between users.</p> <ul style="list-style-type: none"> • Early relaxation of upstream access restrictions prior to downstream targets being met should only occur if there is high confidence in downstream flow predictions meeting targets. • When flow predictions are used for early relaxation of restrictions on upstream access, river system distribution efficiency assumptions should reflect the antecedent extended dry conditions
Water Sharing Plans		
<ul style="list-style-type: none"> • Describe and establish the point at which first flush rules kick in (triggers for first flush management) • Describe the process to be followed to achieve the objective of first flush events in the relevant water source: <ul style="list-style-type: none"> ○ what critical needs will be provided for ○ what local factors are to be considered (e.g. channel capacity) ○ how requirements for the critical needs (targets) are to be quantified ○ how the community will know when take is restricted or permitted • Require Incident Response Guides to set out critical needs at each stage of drought 	<p>The procedure for managing first flush events should take into account unique local factors.</p> <p>Embedding this in WSPs will provide transparency and certainty to community members that relevant matters will be taken into account, and how the water source will be managed. Embedding triggers for first flush management will ensure that water sharing plans are better equipped to deal with drought scenarios and will avoid the need for section 324 orders to override water sharing plan rules.</p> <p>Implementation will require quantifying native title / cultural rights and developing reasonable use guidelines</p>	<p>Trigger for first flush rules</p> <ul style="list-style-type: none"> • Normal access rules cease to apply when the decision-maker determines that a water source is in stage 4 drought • Instead, access is only allowed by Ministerial announcement • Generally, the decision-maker must not allow access unless satisfied that the requirements for the following critical needs have been, or are forecast to be, met: <ul style="list-style-type: none"> ○ stock and domestic watering (under Basic Landholder Rights) ○ native title rights ○ town water supply for X years ○ the critical environmental needs in the specific water source • However, access may be permitted where the decision-maker is satisfied that access will not compromise the ability to provide for critical in-stream or downstream needs • The decision-maker is to determine the requirements to meet critical needs having regard to: <ul style="list-style-type: none"> ○ Long term water plan ○ Antecedent conditions ○ Advice from a local committee <p>Announcements are to be published on XX website at YY time</p>
Incident Response Guides		
<p>Updated based on the WSP process at each stage of drought to identify:</p> <ul style="list-style-type: none"> ○ What are the specific needs for the WSP area? ○ What are the current antecedent conditions? ○ What are the targets (numbers) required to meet the specific needs, based on the antecedent conditions? ○ how first flush targets can be modified during an event if circumstances warrant. 	<p>Provides transparency to targets but enables best available evidence to be taken into account at the time it is required.</p>	<p>Example targets</p> <p>As at [insert date]:</p> <ul style="list-style-type: none"> • River Gauge A: XW ML • River Gauge B: XY ML • River Gauge C: XZ ML

8. Improve flow forecasting modelling and real-time monitoring capability, including measurement of extractions and the hydrometric system for inflows and monitoring end of system flows.
9. Ensure that current (and future) reform programs are accompanied by clear implementation plans and regular communication of progress to the public.
10. Improve and resource communication coordination and capability.

Generally, the recommendations recognise the need to focus the use of limited resources on those efforts that will provide the greatest value in that they will support both first flush and other areas of water reform. Sufficient resourcing will be required to make these changes.

In the face of climate change, the occurrence of cease to flow events is increasing. And while the 2020 Northern Basin First Flush event ultimately led to some wonderful outcomes for the environment and communities, the NSW Government must take steps to avoid a repeat of some of the aspects of the 2020 Northern Basin First Flush event in the interests of agency staff, communities and water users.

1. Introduction

1.1 Preamble

From late January to the end of April 2020, widespread rain fell across various parts of north-west New South Wales and southern Queensland, with some parts receiving more than 200 mm of rain in just a couple of days. This rainfall created significant inflows to the Border Rivers, Peel, Namoi, Gwydir and Macquarie valleys and along the Barwon-Darling River, for the first time in several years following an extended drought period.

A series of temporary water restrictions on extractions in the northern NSW rivers of the Murray-Darling Basin were introduced in January-March 2020, to actively manage the first flows and prioritise water security for critical human and environmental needs which had been exacerbated by the foregoing extreme drought. This became known as the 2020 Northern Basin First Flush event.

Management of the event was complicated by the commencement of the [Water Management \(General\) Amendment \(Exemptions for Floodplain Harvesting\) Regulation 2020](#) on 7 February 2020. This regulation formally permitted, for the first time under the *Water Management Act 2000* (NSW) (WM Act), the take of water via certain floodplain harvesting works without a licence. On the same day, for the first time, floodplain harvesting was prohibited by a temporary water restriction. The restriction was lifted in some areas two days later, when concerns were raised about infrastructure damage being caused by localised flooding events but was reinstated after a few days.

The rain created flows that recommenced and connected the Barwon-Darling River and the northern tributaries. By mid-April 2020 the Barwon-Darling was flowing along its full length from Mungindi, on the Queensland border, into the Menindee Lakes and downstream to Wentworth. Thousands of kilometres of rivers flowed for the first time in many months.

The first flows arrived at Menindee Lakes (Lake Wetherell) on 10 March 2020. Menindee Lakes received almost 670 gigalitres (GL) in total inflows (measured at Wilcannia) to the end of June 2020. On 26 March, an initial high pulse flow was released from the Menindee system into the Lower Darling, followed by a lower base flow, securing 12-18 months' supply to Lower Darling landholders, managing water quality and impacts on remaining fish populations. Flows along the Lower Darling reached the Murray River in mid-April 2020.¹

Despite broad acceptance of the need to protect flows to meet critical needs, the restrictions and management of the event caused widespread angst across the community.

Leading up to the 2020 Northern Basin First Flush event, catchments had been extremely dry, and there had been an extended period of restricted access to surface water resources. The Northern Basin had experienced the lowest inflows over a prolonged period of time, and 2019 was the driest year on record across the Northern Basin, resulting in no connectivity throughout the river system.

Not only was the physical environment under severe stress due to drought, but individuals and communities from the north to the south were also under severe financial, cultural, emotional and physical distress.

This placed great importance on the first major rainfall events of 2020. However, while the NSW Government had put significant resources into the planning and implementation of drought

¹ DPIE Water Drought update - North-west flows in early 2020 - benefits from temporary water restrictions
<https://www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/managing-drought-recovery/north-west-flows-in-early-2020>

management measures within each river system as the drought intensified, it had not sufficiently planned the management arrangements for each system as flows returned.

Management of the event was also complicated by two physical rainfall factors:

- the event was not a singular event, but instead a series of multiple rainfall events, some much larger than forecast, occurring throughout February, March and April across the Northern Basin valleys (in NSW and Queensland), resulting in a number of increases in the forecast of inflows to the Menindee Lakes, and
- in early February, much of the rain fell on unmonitored floodplains rather than in the monitored upper catchments. This rainfall was also unusual, in that the majority of the inflows to the northern tributaries occurred downstream of the major storages, with rain falling across the lower floodplains.

Communities and affected water users across the Northern Basin in NSW and along the Barwon-Darling expressed strong views that there was a lack of advance planning and preparation for the event by the NSW Government agencies. This left communities and affected water users disappointed and frustrated at the lack of engagement or ability to prepare for the event, the lack of transparency regarding the evidence base or framework for decisions being made by the agencies, and the poor quality of communications during and after the event. In a survey conducted for the purposes of this assessment, 70% of people did not think restrictions were communicated clearly, 77% of people did not think the reasons were communicated clearly, and 65% were concerned about the way restrictions were applied.

1.2 Background to this Independent Assessment

In March 2020, the NSW Government commissioned an independent assessment into the management of the 2020 Northern Basin First Flush event after questions were raised by stakeholders about decisions and communications of the water restrictions. In particular, concerns were raised regarding:

- the evidence base for decisions,
- the consistency of decisions with legal requirements, and
- how the restrictions and their reasons were communicated.

1.3 Terms of reference

The Terms of Reference for this Independent Assessment are set out at [Appendix A](#). In brief, the objectives of this assessment are to:

1. Provide transparency about the decision-making processes that were used to manage the event under the [Water Management Act 2000 \(NSW\)](#).
2. Recommend strategies to improve the management of first flush events under the *Water Management Act 2000* in the future, including:
 - a. system and process changes which would improve the management of a first flush event by Department of Planning, Industry and Environment – Water (DPIE Water), the Natural Resources Access Regulator (NRAR) and WaterNSW, and
 - b. regulatory, planning or policy changes (including to relevant water sharing plans) which would improve the management of a first flush event.

An Independent Panel, consisting of Dr Wendy Craik and Greg Claydon, was appointed to review the actions undertaken, consult with affected water users and communities, and report on how systems and processes, and transparency in water management, could be improved in relation to first flush events. Panel member profiles are provided at [Appendix B](#).

In conducting the assessment, the Panel was required to:

- conduct interviews with relevant NSW and Commonwealth agencies,
- obtain the advice of key industry, environmental, indigenous and local government stakeholders via a water user reference group, and
- undertake public consultation for and on the draft report.

2. Assessment approach

2.1 Process to prepare this draft report

Interviews

In the first instance, the Panel held a series of interviews with officials who were directly involved in managing the 2020 First Flush event from DPIE Water, NRAR and WaterNSW.

The Panel then consulted with other agencies including the Commonwealth Environmental Water Office (CEWO), the Murray–Darling Basin Authority (MDBA), the Bureau of Meteorology (BoM) and the Commonwealth Department of Agriculture, Water and the Environment. The Panel also spoke with officers from DPI Fisheries NSW, the Energy, Environment and Science team of the NSW Department of Planning, Industry and the Environment (DPIE-EES), the Queensland Department of Natural Resources, Mines and Energy, the Victorian Department of Environment, Land, Water and Planning, and the NSW State Emergency Services (SES). The South Australian Department of Environment and Water and the Australian Capital Territory Office of the Deputy Director-General, Land Strategy and Environment were also invited to provide feedback. Finally, the Panel spoke with the DPIE Deputy Secretary Water and staff within the Office of the Hon. Melinda Pavey, NSW Minister for Water.

The Panel also spoke separately with Native Title applicant groups for the Ngemba and Gomeroi nations and the Chair of the Southwest Water Users group.

Water User Reference Group

To establish the water user reference group, the Panel sought nominations by peak bodies for representatives for the following interests:

- By NSW Irrigators Council, an irrigation representative for each of the following areas:
 - Northern NSW tributaries
 - Lower Darling
 - Barwon-Darling
- By Local Government NSW, a local government representative for each of the following areas:
 - Northern NSW tributaries
 - Lower Darling
 - Barwon-Darling
- Aboriginal representatives for:
 - the Barkandji Native Title Group
 - the Northern Basin Aboriginal Nations
 - the Murray Lower Darling Rivers Indigenous Nations
- A representative of the Environmental Defender's Office
- A representative of the Australian Floodplain Association.

The water user reference group met five times with the Panel prior to publication of the draft report to provide the Panel with advice, particularly on implications and impacts of decision-making approaches and improvements to communications with water users and the public. A communique for each meeting was made publicly available.

Public consultation

From 11 May 2020 to 7 June 2020, the Panel invited public feedback on the first flush event and how it was managed, through an online survey and written submissions. This feedback (144 online survey responses and 29 written submissions) has assisted the Independent Panel to shape this report's draft findings and recommendations.²

This draft report will be placed on public exhibition from 13 July 2020 to 9 August 2020, seeking the community's written feedback. An information webinar is scheduled for Monday 27 July from 1.00pm to 2:30pm.

2.2 Current situation

At the time of submitting this draft report, river system improvements in recent months across the north-west have now secured critical water supplies for close to two years in most regulated river valleys. The Peel Valley is the only regulated system that continues into 2020/21 with a reduced town water supply allocation of 70%.

High security allocations are reduced in the Peel Valley (once again to 50%) and the Upper and Lower Namoi have a 90% high security allocation. All other valleys in the north-west have full town, domestic and stock and high security allocations.

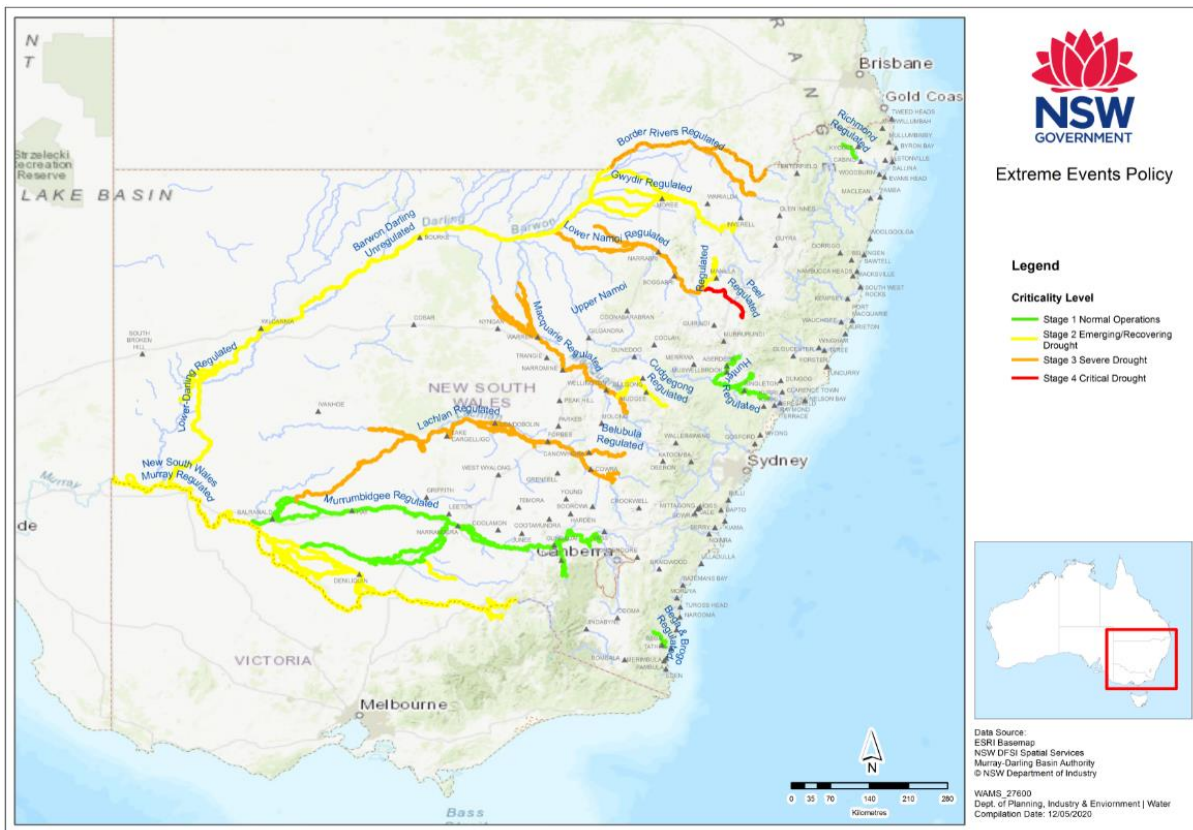
However, most of the major rural storages are still at 20% or less capacity, resulting in only the Lower Darling receiving an opening general security allocation on 1 July 2020 of 30%, and the Border Rivers receiving 7%. All other valleys had no new general security allocation on 1 July 2020.

A summary of current water allocations for regulated river, unregulated river and groundwater water sources and links to comparisons of storage levels, allocations and carryover volumes for this new water year compared to 1 July 2019 is available on the DPIE Water website at <https://www.industry.nsw.gov.au/water/allocations-availability/allocations/summary>.

Chaffey Dam (holding around 15%) which supplies Tamworth remains the storage of most concern. The Peel Valley is still rated as in drought Stage 4 Critical under the Extreme Events Policy (as shown in the map below).

It is now forecast that total flows of over 570 GL will enter Menindee Lakes, with most of the inflow already arrived. Menindee Lakes currently holds 480 GL (10 June) and releases began at the end of March and are continuing to be made to the Lower Darling.

² The written submissions and aggregate survey results are available online at <https://www.industry.nsw.gov.au/water/allocations-availability/northern-basin-first-flush-assessment>.



3. Legislative and regulatory context

3.1 Overview of NSW regulatory framework for water management

In NSW, the take of water is regulated under the WM Act. Section 3 provides that the objects of the Act are *“to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations.”*

The Act broadly provides that water may only be taken from a water source pursuant to:

- an access licence
- a basic landholder right (being a stock and domestic, harvestable or native title right), or
- an exemption from the requirement to hold an access licence conferred by regulations.

A licence does not guarantee the amount of water the holder is entitled to in a given year. Instead, a licence holder must have an ‘allocation’ of water in their account before they can lawfully take water. Water may be allocated to an access licence by way of an available water determination made by the Minister (s 59), or through trade with another licence holder.

Section 5 of the WM Act sets out water management principles, which states in relation to water sharing (ss 3):

- (a) sharing of water from a water source must protect the water source and its dependent ecosystems, and
- (b) sharing of water from a water source must protect basic landholder rights, and

-
- (c) sharing or extraction of water under any other right must not prejudice the principles set out in paragraphs (a) and (b).

Section 9 imposes a duty on all persons exercising functions under the WM Act:

- (a) to take all reasonable steps to promote the water management principles of the WM Act, and
- (b) as between the principles for water sharing set out in section 5 (3), to give priority to those principles in the order in which they are set out in that subsection.

Section 57 establishes different categories for access licences, and section 58 establishes how those categories must be prioritised when making available water determinations under section 59 of the WM Act. The Act also establishes an approval framework for water management works, including floodplain harvesting works.

Water sharing plans made under the WM Act establish the rules for how water in a particular water source is allocated and managed for the duration of the Plan (typically 10 years). Most relevantly, a water sharing plan:

- (a) protects a proportion of all water available for fundamental ecosystem health and/or including specific environmental rules,
- (b) protects the water required to meet basic landholder rights,
- (c) sets annual limits on water extractions, to ensure that extractions do not increase and therefore erode the water for the environment or the security of supply to water users,
- (d) may set different priorities of supply between access licences (distinct from the priorities established by the WM Act),
- (e) may include rules that provide licence holders flexibility in the way they manage their water accounts (e.g. enabling unused water to carry-over between water years),
- (f) may specify rules for water trading and dealings,
- (g) sets out the mandatory conditions that apply to licence and approval holders (which may include conditions which restrict when water may be taken), and
- (h) establishes monitoring and reporting requirements.

3.2 NSW regulatory framework for water management in circumstances of drought

The NSW Government Extreme Events Policy³ sets out broad principles for managing water during a water shortage, extreme drought or water quality event and applies a series of stages for applying increasing restrictions during water shortages. Incident Response Guides (IRGs) outline the framework for managing extreme events according to that policy for each major water source in the NSW Murray-Darling Basin.⁴ Neither the Policy or the IRGs address coming out of a drought to the same degree.

Among others, the Extreme Events Policy and IRGs identify the power for the Minister or delegate to make temporary water restriction orders under section 324 of the WM Act as a tool to manage water in an extreme event.

Section 324 (1) of the WM Act states:

³ Available online at https://www.industry.nsw.gov.au/__data/assets/pdf_file/0008/187703/Extreme-Events-policy.pdf

⁴ See for example the IRG for the Barwon-Darling available at https://www.industry.nsw.gov.au/__data/assets/pdf_file/0009/273753/schedule-g-barwon-darling-irg.pdf

324 Temporary water restrictions

- (1) If satisfied that it is necessary to do so in the public interest (such as (but not limited to) to cope with a water shortage, threat to public health or safety or to manage water for environmental purposes), the Minister may, by order in writing, direct that, for a specified period, the taking of water from a specified water source is prohibited, or is subject to specified restrictions, as the case requires.

Section 324 (2) provides a separate power to make temporary water restrictions in regard to aquifers.

According to section 324(1) of the WM Act, the decision-maker must:

- be satisfied that it is necessary to make the restriction in the public interest. Examples of the public interest are given (to cope with a water shortage, threat to public health or safety or to manage water for environmental purposes), but these are not exhaustive,
- decide how long the restriction needs to have effect. It cannot be indefinite,
- decide the water sources to which the restriction needs to apply, and
- decide whether it is necessary to:
 - prohibit water to be taken, or
 - restrict water being taken, for example
 - by certain people
 - for certain purposes, or
 - by a certain amount.

An order only has effect upon publication in the NSW Government Gazette and in the authorised manner, or on the earlier date it is broadcast by a television or radio station transmitting to the part or parts of the State within which the water source is situated (s 324 (3) - (5)).

There is no express power to amend or repeal temporary water restrictions in the WM Act. However, under section 42 (2) of the *Interpretation Act 1989* (NSW), any power to make an order includes the power to amend or repeal the order. Therefore, temporary water restrictions can only be amended or repealed using the same process that applies to the making of the order (meaning the amendment or repeal can only take effect upon publication of the order in the NSW Government gazette, or earlier broadcast on television or radio). However, orders can be drafted in a way that allows temporary water restrictions to be 'lifted' in an administratively simpler way. This approach is explained further in section 5.1 of this report.

Other relevant provisions that continue to apply in drought circumstances include section 9 (1) (a) of the WM Act, which imposes a duty on the decision maker to give priority to the water sharing principles in section 5 (3) in the following order:

- (a) sharing of water from a water source must protect the water source and its dependent ecosystems, and
- (b) sharing of water from a water source must protect basic landholder rights, and
- (c) sharing or extraction of water under any other right must not prejudice the principles set out in paragraphs (a) and (b).

Section 58 of the WM Act establishes the following order or priority between access licences:

- (a) local water utility access licences, major utility access licences and domestic and stock access licences have priority over all other access licences,
- (b) regulated river (high security) access licences have priority over all other access licences (other than those referred to in paragraph (a)),

- (c) access licences (other than those referred to in paragraphs (a), (b) and (d)) have priority between themselves as prescribed by the regulations,
- (d) supplementary water access licences have priority below all other licences.

Those rules of priority also apply to making available water determinations, unless:

- they are otherwise amended by a water sharing plan (s 58 (3) of the WM Act), and
- a water sharing plan is suspended, in which case (pursuant to section 49A and 49B):
 - first priority is to be given to domestic and essential town services or critical human water needs, and
 - second priority is to be given to the needs of the environment.

While those rules are relevant, because of section 324 (7), they do not have to apply strictly to making temporary water restrictions. That subsection states:

In the event of any inconsistency between an order under this section and any other provision of this Act relating to the distribution, sharing or taking of water (including any order made, or any condition imposed on an access licence or approval, under this Act), the order under this section prevails to the extent of the inconsistency.

There is no other tool in the WM Act for managing first flush events. However, water sharing plans could include rules to manage these matters. For example, the *Water Sharing Plan for the Barwon-Darling Unregulated River Water Sources 2012*, as amended on 1 July 2020, includes a resumption of flow rule.⁵

Figure 1 illustrates the interaction between the Act, Extreme Events Policy and IRGs.



Figure 1 Relationship of Incident Response Guides to other documents relevant to the WRP framework.

Source: [Incident response Guide for the Barwon-Darling Watercourse Water Resource Plan Area \(SW12\) July 2019](#)

3.3 Agencies involved in the management of water in NSW

Water in NSW is managed by both State and Federal legislation.

At the state level, in simple terms, water is managed by three separate agencies:

- The Department of Planning, Industry and Environment (DPIE) makes the rules,

⁵ See <https://www.industry.nsw.gov.au/water/plans-programs/water-resource-plans/drafts/barwon-darling>.

-
- WaterNSW implements the rules, and
 - NRAR enforces the rules.

Further, there are two separate groups within DPIE with functions related to water management in NSW, being DPIE Water, and DPIE-EES.

1. Department of Planning, Industry and Environment - Water

DPIE Water supports the NSW Minister for Water in the administration of the WM Act. This means that DPIE Water:

- administers the WM Act, including to exercise Ministerial functions under that Act by delegation. This includes:
 - development of policy frameworks such as the Extreme Events Policy and the floodplain harvesting policy,
 - development of water sharing plans and regulations, and
 - the making of available water determinations and temporary water restrictions, and
- leads negotiations with the Commonwealth (including the MDBA) and other jurisdictions in relation to water management in NSW.

2. Department of Planning, Industry and Environment - Energy, Environment and Sciences

DPIE-EES has a specialised role in NSW water management. It:

- develops long term water plans that guide the management of water for the environment over the longer term, as required under the Basin Plan,
- manages the state's environmental water holdings,
- provides advice to WaterNSW and DPIE-Water on the management of planned environmental water, the planning and delivery of environmental watering events, and environmental watering requirements in water planning processes, and
- prepares the technical content of floodplain management plans.

3. WaterNSW

WaterNSW is the NSW bulk water supplier and operational manager of surface water and groundwater resources. This means that WaterNSW:

- supplies water from the state's regulated surface water systems to water users,
- operates the state's river systems and bulk water supply systems,
- carries out forecasting and operational modelling associated with the management of surface water systems, working closely with the BoM as required, and
- conducts customer facing functions such as the delivery of water, billing, water allocation and licence trades and providing water resource and metering information.

4. Natural Resources Access Regulator

NRAR is an independent regulator established by the *Natural Resources Access Regulator Act 2017* (NSW). NRAR is responsible for compliance and enforcement of NSW water law. This means that NRAR:

- investigates allegations of non compliance with the WM Act, and
- determines when to commence prosecutions or uses other enforcement tools in the event of non-compliance.

NRAR is also responsible for administering licensing requirements for government entities and in connection with state significant development and state significant infrastructure (under the *Environmental Planning and Assessment Act 1979* (NSW)).

Other State and Commonwealth agencies also have a strong interest in NSW water management. The Commonwealth Department of Agriculture, Water and the Environment is responsible for administering the *Water Act 2007* (Cth), which establishes the Basin Plan 2012. The MDBA plays a key role in implementing the Basin Plan 2012. In particular, the MDBA:

- operates the River Murray system, and directs the sharing of the River Murray's water on behalf of the Basin states in accordance with the Murray Darling Basin Agreement,
- advises the Commonwealth Minister for Water Resources on the accreditation of NSW water resource plans,
- measures, monitors and records the quality and quantity of the Basin's water resources,
- supports encourages and conducts research and investigations about the Basin's water resources and dependent ecosystems,
- provides water rights information to facilitate water trading across the Basin, and
- engages and educates the Australian community about the Basin's water resources.

The Commonwealth Environmental Water Holder (CEWH) manages a large portfolio of licences for environmental water, having regard to annual priorities and longer-term targets set under the Basin Plan.

The Queensland Department of Natural Resources, Mines and Energy (DNRME) also works with DPIE Water to jointly manage the Border Rivers, in accordance with the NSW-Queensland Border Rivers Intergovernmental Agreement 2008.⁶ The *New South Wales - Queensland Border Rivers Act 1947* (NSW) provides for the establishment of the Dumaresq-Barwon Border Rivers Commission. DNRME is solely responsible for managing other Northern Basin river systems in Queensland which flow into NSW.

4. Lead up to the 2020 Northern Basin First Flush Event

4.1 Climate conditions until December 2019

From 2017 until the rains in early 2020, northern inland New South Wales had been experiencing record drought conditions. Inflows to the Northern Basin over the previous two years (135 GL in 2018 and 94 GL in 2019) had been less than half of the previous lowest inflows (276 GL in 1994).⁷

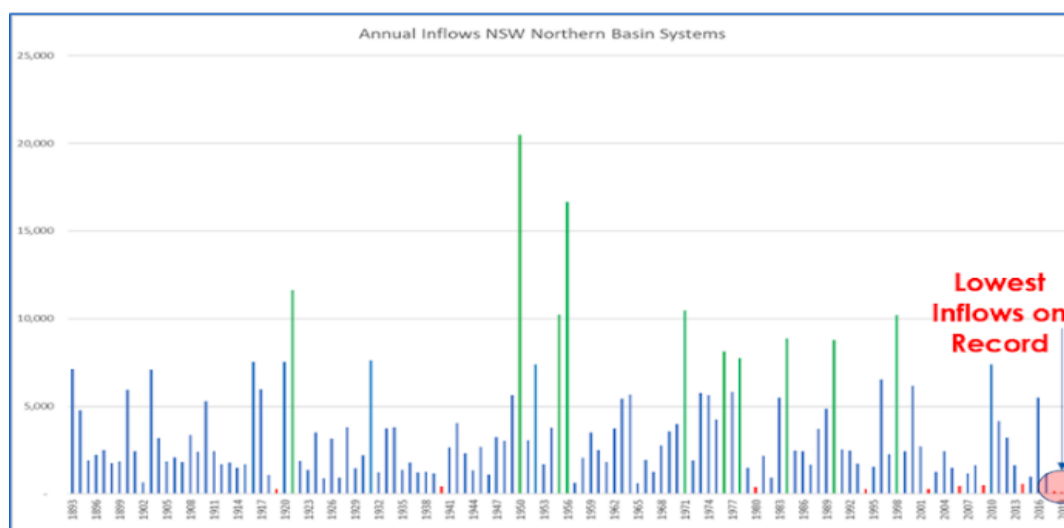
Many regional towns and villages relied on emergency groundwater bores or water carting to maintain basic domestic supply and irrigators had very limited or no access to water for extended periods (in some cases, for years). Water quality had deteriorated and large-scale fish deaths occurred in some areas. Some major river systems had ceased to flow for extended periods, including:

- the Namoi River below Keepit Dam,
- Gwydir below Tarelaroi Weir,
- the Lower Darling River below Menindee Lakes,

⁶ Available at https://www.dnrm.qld.gov.au/_data/assets/pdf_file/0006/105963/intergovernment-agreement.pdf

⁷ Written submission of WaterNSW dated June 2020.

- the Macintyre River below Boggabilla,
- the Macquarie River below Warren,
- the Peel River below Dungowan, and
- the significant stretches of the Barwon-Darling system.⁸



Combined inflows to Northern NSW Tributaries of the MDB.

Source: WaterNSW

Since mid-2017, there had been only one period in early 2018 when rainfall produced any significant inflows, which were protected from irrigation extraction and followed up by releases of held environmental water to improve the health of the river. Between mid-2018 and early 2020, there was no significant natural inflow into the northern NSW basin. Releases of held environmental water from storages in 2019 were the only source of inflows into some sections of the Barwon River during that time.

The regulatory framework for extracting water from rivers and streams reflected the dry conditions. Unregulated river system licence holders could not take water as their flow thresholds for take were not being met. In the Northern Basin of the Murray-Darling Basin, given the lack of inflows, no new allocations had been made for some time, and temporary water restrictions were in place prohibiting or limiting the take of unused water remaining in accounts.

Some allocations had been made to high security licences in a number of water sources, but in some areas, take was still restricted by section 324 orders. Deliveries to regulated river system licence holders in the lower reaches of the Macquarie, NSW Border Rivers and Peel Rivers were unavailable, so these licences were also subject to temporary water restrictions. The environmental water rules of water sharing plans applying to the Macquarie, Belubula and Peel systems were suspended, leading to a change of priorities between water users if and when water allocations were made.

The drought placed significant stress on the local environment, as well as extractive water users, dry land farmers and communities.

⁸ See more at <https://www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/managing-drought-recovery/north-west-flows-in-early-2020>

4.2 Independent assessments of NSW Water Management

Since 2017, several reports have assessed the management of water in NSW. Of particular relevance to the management of first flush events and this review:

- Ken Matthews' Independent investigation into NSW water management and compliance, in an [Interim Report](#) dated 8 September 2017 and a [Final Report](#) dated 24 November 2017 (commonly known as the Matthews Inquiry).
- Independent assessment of the 2018-19 fish deaths in the lower Darling dated 29 March 2019 (commonly known as the [Vertessy Report](#))
- Natural Resources Commission Review of the Water Sharing Plan for the Barwon-Darling Unregulated and Alluvial Water Sources 2012, Final report dated September 2019 (commonly known as the [NRC Review](#))
- The Australian Academy of Science [Investigation of the causes of mass fish kills in the Menindee region NSW over the summer of 2018–2019](#) dated 18 February 2019, and
- Interim Inspector-General of Murray-Darling Basin Resources Report on the [Impact of lower inflows on state shares under the Murray–Darling Basin Agreement](#) dated March 2020 (commonly known as the Keelty Report).

The NSW Government issued responses to the recommendations by way of the [NSW Water Reform Action Plan](#) (in regards to the Matthews Inquiry) and the [NSW Government response to the Vertessy Report and the Natural Resources Commission's review of the Barwon-Darling Water Sharing Plan](#) dated September 2019.

Most relevantly, the NSW Government agreed to take steps to, among other things:

- clarify responsibilities in water management,
- implement a robust metering framework,
- increase transparency in water management,
- create and implement a stakeholder engagement framework,
- adopt innovative technologies to improve compliance effectiveness,
- protect water (and particularly the first flush) for towns and the environment,
- improve the representation of Aboriginal cultural interests and values in water management, and
- improve connectivity between Northern Basin river systems.

Chapter 8 of this Report has a discussion of these matters and [Appendix C](#) includes a list of commitments made in the NSW Government responses to the Matthews Inquiry, Vertessy Report and NRC Review.

DPIE Water has commenced a number of work programs which implement the Water Reform Action Plan and the Government's response to the Matthews Inquiry, Vertessy Report and NRC Review.

Under new non-urban metering rules, licensed works for taking water will need an accurate, tamper-proof meter with a telemetry-capable data logger installed and checked by a qualified person. Surface water works greater than 200mm will also need to remotely transmit data about water use via the NSW Government's telemetry system which became operational in April 2020. The telemetry system will be used by NRAR, DPIE Water and WaterNSW to support compliance and enforcement, policy and planning, river operations and billing functions, and may be adopted voluntarily by other water users to reduce their ongoing compliance burden.

The new rules, when fully rolled out, will capture more than 95 percent of licensed non-urban water take capacity in NSW. The new metering rules are taking effect in a staged roll-out between 2019 and 2023. The new requirements will apply from:

- 1 April 2019, to new and replacement meters installed after this date
- 1 December 2020, to surface water pumps 500mm and greater
- 1 December 2021, to remaining works in the Northern Inland region
- 1 December 2022, to remaining works in the Southern Inland region
- 1 December 2023, to remaining works in the Coastal region.

To improve connectivity between Northern Basin river systems:

- from 1 December 2020, the water sharing plans applying to unregulated surface water river systems in the Barwon-Darling, Macquarie Bogan and Gwydir water sharing plans include new rules which ensure water released for the environment remains in the river for its intended environmental purpose (by providing that licence holders must only take water in accordance with an announcement, known as 'active management')
- from 1 July 2020, the *Water Sharing Plan for the Barwon-Darling Unregulated River Sources 2012* also includes new rules which:
 - amended flow class thresholds applying to A class access licences based on enhanced flow targets that focus on protecting low flows to better deliver environmental and social outcomes,
 - place a limit on the amount of water that can be extracted per day under unregulated river class A, B and C class access licences (by introducing individual daily extraction components on relevant licences, also known as IDECs), and
 - restrict the ability to take water from the first flows after an extended low flow or dry period (known as a 'resumption of flow' rule).

Active management rules are to be accompanied by monitoring and reporting requirements to provide transparency and ensure that management and operational practices continue to improve based on previous experiences. Some data will be recorded daily, and others monthly, annually or on an event-by-event basis. If successful, active management may then be implemented in other unregulated water sources.

Other work planned by DPIE Water includes:

- a review (by the end of June 2021) of the flow targets and approach in the Interim Unregulated Flow Management Plan for the North-West. That plan was developed in 1992 to protect riparian rights, suppress algae blooms and enable fish migration by recognising connectivity across the Northern Basin, and
- working with Queensland to improve flow forecasting arrangements and held environmental water protections for water coming across the border by the end of 2020.

Finally, DPIE has been working with water users and the public to put in place a licensing system and monitoring regime for floodplain harvesting. Licensing floodplain harvesting will ensure that it is managed within the limits established by water sharing plans and the Cth Basin Plan 2012. DPIE expects the licensing framework for floodplain harvesting to be operational in all water sharing plans by 2021. DPIE is also working to have a robust measurement, monitoring and evaluation program in place to help determine if the rules are effective and being followed, and whether they need to be modified over time.

4.3 Floodplain Harvesting Policy

Historically, the take of water via floodplain harvesting has not been licenced under the WM Act, or its predecessor the *Water Act 1912* (NSW), which only enabled the licensing of water taken from watercourses, lakes and specified aquifers and approvals for works that affect the flow of water to or from a river or creek.

When the WM Act commenced, work began to licence and regulate floodplain harvesting, leading to the introduction of the NSW Government [Floodplain Harvesting Policy](#) in 2013 (the FPH Policy). The policy outlines a process to bring floodplain harvesting into the WM Act licensing framework, and stop unconstrained floodplain harvesting in NSW.

The FPH Policy (as amended in 2018) is currently being implemented in the designated floodplains of the five northern NSW Murray-Darling Basin valleys (the NSW Border Rivers, the Gwydir, the Namoi, the Macquarie and the Barwon-Darling), and will enable floodplain diversions to be subject to statutory limits both under NSW water sharing plans and the sustainable diversion limits imposed under the Commonwealth Basin Plan 2012. Floodplain harvesting licences and approvals for all five Northern Basin valleys are scheduled to be in place by July 2021. Landholders who receive a floodplain harvesting access licence will be required to contract duly qualified persons to install telemetry-enabled storage meter equipment to accurately measure floodplain harvesting to ensure that landholders remain within their licence limits.

In 2018, the MDBA and DPIE jointly commissioned an [Independent review of the implementation of the Floodplain Harvesting Policy in northern NSW](#). The key objective was to provide transparency around the technical information and improve confidence in the technical rigour and processes supporting implementation of the policy.

DPIE accepted the review recommendations in full and developed a [Floodplain Harvesting Action Plan](#) in response. Key priorities in that plan are to:

- provide clarity about how floodplain harvesting will be managed,
- protect the environment and downstream water users,
- provide certainty for irrigators legally taking water from a floodplain,
- provide a licensing framework that supports compliance,
- ensure stakeholders and industry have a say in water sharing rules for floodplain harvesting, and
- rebuild trust in water management in NSW.

Most relevant to activities during the lead up to the 2020 first flush event, the implementation process outlined in the FPH Policy includes providing a temporary exemption for floodplain harvesting from specified licensing and approvals requirements of the WM Act until the licensing process is completed.

4.4 Review of NSW Water Sharing Plans and preparation of water resource plans

Water sharing plans are a key component to implementing the Basin Plan in NSW. Relevant rules within NSW water sharing plans will form part of NSW water resource plans, when accredited. Throughout 2018 and 2019, DPIE Water prepared amendments to water sharing plans, in consultation with communities, to make them consistent with Basin Plan requirements. This will require changes to the following plans which cover water sources directly relevant to the management of the 2020 first flush event (as they were known immediately prior to 1 July 2020):

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- Water Sharing Plan for the Barwon-Darling Unregulated and Alluvial Water Sources 2012,
 - Water Sharing Plan for the Belubula Regulated River Water Source 2012,
 - Water Sharing Plan for the Castlereagh River Unregulated and Alluvial Water Sources 2011,
 - Water Sharing Plan for the Gwydir Regulated River Water Source 2016,
 - Water Sharing Plan for the Gwydir Unregulated and Alluvial Water Sources 2012,
 - Water Sharing Plan for the Intersecting Streams Unregulated and Alluvial Water Sources 2011,
 - Water Sharing Plan for the Lower Murray-Darling Unregulated and Alluvial Water Sources 2011,
 - Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2016,
 - Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012,
 - Water Sharing Plan for the Namoi Unregulated and Alluvial Water Sources 2012,
 - Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016,
 - Water Sharing Plan for the NSW Border Rivers Regulated River Water Source 2009, and
 - Water Sharing Plan for the NSW Border Rivers Unregulated and Alluvial Water Sources 2012.

Amendments to water sharing plan provisions applying to unregulated river water sources came into force on 1 July 2020.

These changes were developed by DPIE Water in targeted consultation with stakeholder advisory panels, which include representatives from NSW government agencies, water users, environmental interest groups, Aboriginal communities and local councils, for each water resource plan area.

Under section 43A of the WM Act, the Natural Resources Commission is also required to independently review water sharing plans approaching expiry, and report its findings to the Minister for Water. The NRC report must review:

- (a) the extent to which the water sharing provisions have materially contributed to the achievement of, or the failure to achieve, environmental, social and economic outcomes, and
- (b) whether changes to those provisions are warranted.

The NRC Review of the Barwon-Darling Water Sharing Plan, mentioned in section 4.2 of this draft report, was brought forward at the request of the then Minister for Regional Water (with the support of the Premier), having regard to the high public interest in the operation of the Plan and downstream fish deaths.

The NRC Review led to proposed changes to the Plan which came into effect on 1 July 2020, including the revision of 'commence to pump' and 'cease to pump' rules (which determine when water extraction can commence and when it is prohibited, and together restrict extraction during low flows), the removal of 'imminent flow' provisions (which allowed water to be taken from low flows when a flow event was predicted with certainty), and contributed to the proposed introduction of a 'resumption of flow' rule (which protects the critical first flows after an extended low flow or dry period).

4.5 Development of Long Term Water Plans

Under the Basin Plan, NSW must prepare a long-term environmental watering plan for each water resource plan area that includes surface water. The plan must identify priority environmental assets and priority ecosystem functions in the relevant area, ecological objectives and ecological targets for those assets and functions, and the environmental watering requirements required to meet those targets.

In NSW, these plans (called 'long term water plans') were prepared by DPIE-EES and, following public exhibition throughout 2018 and 2019, were finalised in late December 2019.

4.6 Use of temporary water restrictions to manage “First Flushes” prior to the 2020 event

Northern Basin connectivity event (April 2018)

In January 2018, over 1,000 km of the Barwon-Darling River downstream of Brewarrina had ceased to flow. Extended dry conditions caused town water supplies to decline and there was concern about water security for landholders. Water quality in stagnant water holes deteriorated and blue-green algae alerts escalated to amber and red along the Barwon-Darling and there were concerns about the risk to survival of native fish having regard to these conditions.

In February and March 2018, rainfall in Queensland resulted in first flush flows into and along the Barwon-Darling. Unlike the 2020 Northern Basin First Flush event, there was reasonable advance notice of the flows entering NSW water sources from across the Queensland border.

The NSW Water Minister restricted the take of this water by A, B and C-class water access licences in the Barwon-Darling Unregulated River by a temporary water restriction under section 324 of the WM Act.⁹

The restrictions were introduced having regard to targets and triggers identified in a draft Environmental Water Immediate Response Protocol and the 1992 Interim Unregulated Flow Management Plan for the North-West. Only the extraction of water for town water supply, stock and domestic use and irrigation of existing permanent plantings was permitted.

The restrictions protected flows to replenish town water supplies and provide stock and domestic water for riparian landholders (supporting basic landholder rights), achieved connectivity along the Barwon-Darling River starting from the Moonie, Condamine-Balonne/Culgoa and Warrego systems to the Darling at Wilcannia, and filled the Bourke and Brewarrina weir pools. 670 ML of water flowed past downstream Wilcannia and [DPIE's analysis](#) indicated that up to 16,000 ML of water was protected from extraction by the section 324 order. This water partly replenished drought refuge waterholes and provided some short-term connectivity between waterholes.

Although this event led to inevitable local increases in salinity as flows passed along the river system, these increases were temporary, decreasing as river levels reduced. Monitoring suggests that the flows broke down blue-green algae concentrations from Collarenebri and Walgett. The DPI Fisheries habitat mapping project also found that the event inundated the following proportions of mapped large woody habitat:

- upstream of Walgett-Brewarrina - approximately 48%
- Brewarrina-Bourke river section - 23%
- Bourke-Tilpa river section - 27%
- Tilpa-Wilcannia river section - 11%.

⁹ [Government Gazette No 27 of 8 March 2018, p2](#) and [No 37 of 29 March, p2-4](#).

Following this rainfall event, in April 2018, the CEWO and DPIE-EES (known at the time as the Office of Environment and Heritage) used their licensed environmental water from the Gwydir and Border Rivers catchments to deliver a northern (rivers flow) connectivity event. The flows from these water orders were protected from pumping for irrigation by another section 324 order.¹⁰

According to the [CEWO Northern Connectivity Update No 8](#) dated 20 July 2018, building on the natural unregulated flows, the northern connectivity event sought to benefit native fish along rivers in the northern Murray-Darling Basin by improving longitudinal connectivity, providing improved food sources and opportunities to move and disperse to better habitats. This created an innovative flow event in an unregulated river (the Barwon-Darling) using water from dams (regulated sources).

The event was supported by a range of face-to-face engagement activities and [a series of written updates](#). In total, 7.5 GL of water passed Wilcannia.

In May 2020, DPIE Water published a fact sheet outlining [observations from the March-April 2018 s. 324 event](#). In the lessons learnt, it identified that:

- the section 324 order effectively reduced pressure on Brewarrina and Bourke town water supplies as protected water re-filled weir pools for town water supply and supported basic landholder rights. Monitoring compliance with restrictions is also important to ensure their effectiveness,
- media coverage was patchy in the Barwon-Darling, and anecdotal evidence suggested a number of target audience members did not receive adequate notification. Media coverage must be accompanied by whatever complementary means can be generated to improve the likelihood of successful communication,
- there should be adequate monitoring and reporting protocols in place for such events to account for the outcomes achieved against the objectives of the event, and provide a sound foundation for transparency in reporting and interpreting where improvements have been made based on lessons learned from previous events, and
- a coordinated effort by both State governments to protect flows could have led to better outcomes for communities and the environment (as some flows were extracted in Queensland before being protected from the NSW boundary). However, where the release of regulated environmental water was a joint undertaking between State and Commonwealth governments, the interagency coordination contributed to the effective management of this event and provides an example for future flow events.

April 2019 event

On Saturday 30 March 2019, rainfall led to inflows to the Peel, Namoi and Macquarie River catchments. A section 324 [temporary water restriction](#) was imposed on Sunday 31 March 2019 due to extended drought conditions, to protect inflows:

- in the Namoi, for essential needs (such as town water supplies, stock and domestic and basic landholder rights) and to enable delivery of high security water, and improve the possibility for various flows to connect the full length of the Namoi River from the junction of the Peel River to the Walgett Weir, and
- in the Macquarie, for essential needs (such as town water supplies, stock and domestic and basic landholder rights) and to maximise the potential for connection to the Barwon-Darling.

¹⁰ [Government Gazette No 45 of 20 April 2018, p 750041](#)

At the time, while the restrictions were largely supported by irrigators (with some voluntary embargoes already in place), concerns were raised about the inadequate notice given to water users of the formal restrictions being imposed.¹¹ The lack of notice also led to logistical challenges for NRAR, who had to deploy staff at short notice, and who were confronted with disgruntled water users.

Following this event, DPIE Water recognised a need to increase the planning, preparedness and coordination capabilities to manage rainfall events during the drought. Efforts were made to:

- document decision-making processes, workflow requirements and the roles and responsibilities of various stakeholders in the management of section 324 orders,
- establish a working group involving water planning, legal and NRAR staff, who met regularly to discuss the potential need and development of section 324 orders to manage the drought,
- develop a decision-making framework that could be used to manage a potential northern valley first flush event, and
- develop alternative, proactive and adaptive approaches to managing rainfall events, such as:
 - drafting section 324 orders to enable flow events to be ‘actively managed’, by inserting the ability for restrictions to be lifted in a simple administrative manner, with the approval of certain Directors within DPIE Water, and
 - ‘proactively’ imposing section 324 orders, to ensure water users understood well before any rain event, that take of the first flows would be restricted (see Chapter 5 of this draft report for more details).

Northern Fish Flow (April - June 2019)

Between April and June 2019, the CEWO and then NSW Office of Environment and Heritage (now known as DPIE-EES) arranged for the release of 27-36 GL of their licensed water held in Glenlyon and Copeton dams for the environment for northern NSW Basin rivers with DPIE Water and WaterNSW. The purpose of the flow was to top up waterholes along the Dumaresq, Macintyre, Gwydir, Mehi and Barwon rivers, enhancing fish habitats, river health, and support important Aboriginal environmental, cultural and spiritual values in the river systems.

DPIE Water imposed a section 324 temporary water restriction¹² to protect that water as it flowed through the Barwon-Darling Unregulated River Water Source.

The timing of the event had regard to the fact that:

- the absence of summer rains in the Northern Basin led to fish being confined to small, shallow, stagnant waterholes,
- recent rains would assist the flow, and
- cooler temperatures would improve water distribution efficiencies (including with less evaporation) and reduce the risk of spread of blue-green algae.

The Northern Fish Flow event followed the large fish death at Menindee Lakes over the summer of 2018 – 2019, and improved water quality, connected rivers, helped native fish survive along 1,500 km of the river system and provided relief to communities who had not seen parts of the rivers flow for nearly a year (such as Walgett). The flows travelled through the traditional lands

¹¹ Moree Champion, “*Watchdog investigating water embargo breaches in the Namoi catchment*”, 8 April 2019

¹² NSW Government Gazette No 35 of 16 April 2019 at 1170-1173.

of many Aboriginal nations, supporting important environmental, social and cultural values. Queensland also protected the flow from take for irrigation purposes.

The Barwon River at Walgett would have ceased to flow for around 630 days between May 2018 and February 2020, had it not been for the Northern Connectivity Event and the Northern Fish Flow Event.¹³

4.7 Preparation of the Floodplain Harvesting Exemption

In October 2019, the NSW Minister for Water gave in-principle approval for the drafting of a regulation to make it clear that an access licence would not be required to take water via certain floodplain harvesting works:

- in areas where the FPH Policy has not yet been implemented, and
- in other areas not designated as floodplains.

This exemption was flagged in the FPH Policy in 2013 as a key step to transitioning floodplain harvesting activities into the WM Act framework, but had not been codified.

The renewed focus on water compliance since the Matthews Inquiry and creation of NRAR increased the importance of codifying the exemption, but drought conditions meant there was no floodplain water harvesting.

Following Ministerial approval, drafting of the regulation was completed on 20 December 2019.

4.8 January 2020 rainfall, temporary water restrictions and preparation to commence the floodplain harvesting exemption

In mid-January 2020, the BoM advised of a forecast widespread rain event in the east of Australia from Thursday, 16 January. The trough was forecast to be slow moving and the BoM predicted accumulated rainfall totals of 30 – 80 mm over a four day period.

Due to the severe drought conditions, DPIE Water deemed it in the public interest to impose the section 324 [Temporary Water Restriction \(Northern NSW Murray Darling Basin\) Order 2020](#) to prevent regulated and unregulated access licence holders in the Northern NSW Murray Darling Basin from taking water arising from this event from 17 to 31 January 2020. The restriction aimed to protect flows to meet critical needs (being town water, domestic and stock, and basic landholder (including Native Title) rights, the needs of critical drought refuge areas and filling of water holes along the river), and promote system wetting, replenish and maintain drought refuge pools and facilitate system connectivity to improve the likelihood of flows from this and subsequent events reaching the lower Darling.

At the same time, DPIE Water took steps to commence the floodplain harvesting regulation on 24 January 2020. However, as the temporary water restriction in place at the time did not restrict floodplain harvesting, the regulation was put on hold to ensure that floodplain harvesting would be temporarily restricted under section 324 of the WM Act consistent with other forms of take when the regulation commenced.

Meanwhile, the January rain in the northern NSW Murray Darling Basin led to short, sharp inflows into some of the unregulated river systems, but no persistent flows except for in the unregulated upper Namoi and Peel catchments on 26 January 2020. Approvals to take surface water in these catchments were granted as higher priority needs (such as requirements for the

¹³ Commonwealth Environmental Water Office Northern Fish Flow 11 September 2019 wrap-up, available at <https://www.environment.gov.au/system/files/resources/6e450083-697d-4da6-aceb-d2a878114373/files/northern-fish-flow-wrap.pdf>

water source and its dependent ecosystems, basic landholder rights and town water supply) had been met.

In particular, high security access in the Peel Regulated River Source and unregulated access in the Mooki River and Quirindi Creek water sources was granted from 26 January 2020, after it was assessed that access would not impact the ability to achieve connectivity from Tamworth down to the Namoi River junction or the replenishment target at Carol gap, given:

- the flows were not forecast to extend downstream to meet other targets,
- the small volume of high security take, and
- the small pump sizes of unregulated users in the Mooki River and Quirindi Creek water sources relative to the flow rates.¹⁴

As detailed in Chapter 6 of this draft report, on 30 January 2020, the temporary water restriction was extended to 17 February 2020, having regard to follow up rainfall events forecast by the BoM to occur in February, and for reasons similar to those applying to the initial making of the order. The approvals to take from the Peel, Mooki and Quirindi Creek water sources were extended to 7 February 2020.

5. Preparation for the first flush event

5.1 Steps taken to prepare for the first flush event

The proposal for a pre-emptive restriction

Since 2018, the Department has had documented processes and templates to support internal decision-making process for making, amending and repealing temporary water restrictions. This included the routine online publication of the reasons for any decisions to make, amend or repeal standard temporary water restrictions (See [Appendix D](#)).

In Northern Community Drought meetings held in late May/early June 2019, water users sought clarity around when and how DPIE Water decides to apply water restrictions and asked that the government provide advance warning of the need for restrictions.

Information available to the Panel is that DPIE Water developed a proposal to proactively impose a temporary water restriction to protect the first inflows in the Northern Basin for critical water needs. Under the proposal:

- the initial aim was to ensure that local critical water needs were met with the first inflow volumes, and also to facilitate downstream system wetting, and maximise downstream system wetting and the prospects of flows reaching the Lower Darling,
- the objective was to address critical water needs (being town water supply, critical in-stream needs and basic landholder rights, including harvestable, domestic and stock and native title rights) and also high security licensed water entitlements in the northern catchments and the Barwon-Darling and Lower Darling systems, and maximise the prospects of early system recovery, and
- a restriction would be applied in advance (pre-emptively) and ahead of any forecasted uncontrolled flows, to give certainty and provide transparency for affected water users about when a restriction applied and when it might be lifted.

While the exact flow triggers would not be specified, principles for lifting (such as sufficient supply for towns for the next few months) would be. Restrictions would directly apply to the

¹⁴ See approval to take published on the DPIE Water website at https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/288757/active-mgmt-peel-mooki-quirindi.pdf

unregulated river users, but also indirectly to access to general security (carryover) and supplementary access entitlement holders. Consideration would be given to allowing access to overbank flows that would not return to the river (See [Appendix E](#)).

The 'proactive' or 'pre-emptive' restriction overcame challenges with the existing approach of applying restrictions on an event-by-event basis as uncontrolled flows occurred. These challenges included timely gazettal (and commencement) of restrictions, managing expectations of water users, and ensuring that water users were sufficiently aware of the restrictions to avoid compliance issues.

However, when the proposal was provided to irrigation representatives in July 2019, they raised concerns that restrictions would not be lifted in a timely manner, and could lead to lost opportunities to consumptive water users.

Ultimately, this proactive approach was only implemented during the Christmas period of 2019/2020, in recognition of the additional challenges that would arise to make and notify water users of water restrictions if the need arose during the Christmas period.¹⁵

Adoption of adaptive management provisions in section 324 orders

As flagged in 2019 to irrigator representatives, to improve the ability to actively manage flows under a temporary water restriction (and avoid delays arising from administrative and gazettal processes), in October 2019, the Department began incorporating a 'responsive management approach' to temporary water restrictions.

Orders included provisions to allow certain executives within DPIE Water to 'approve' a person to take water notwithstanding the temporary water restriction, upon certain requirements being met. These became known as approvals 'to take', or 'to lift' a restriction, and the provisions were:

- included in proactive temporary water restrictions imposed over the Christmas period of 2019/2020, and
- used to manage the first flows arising from rainfall in mid-January 2020 (described in Chapter 4).

Determining the Needs of the Environment During an Extreme Event (the NEDEE project)

In early July 2019, DPIE Water began working with DPIE-EES and DPI Fisheries to determine the critical environmental needs that should be targeted in the northern valleys under various first flush scenarios, particularly in circumstances where water sharing plan rules were suspended. The 'Needs of the Environment During Extreme Events' (NEDEE) results would provide a basis for DPIE Water to demonstrate these environmental needs had been considered when allocating water and sharing uncontrolled tributary inflows. The work was intended to contribute to the implementation of a proactive restriction on irrigation take in the north-western valleys to protect critical needs (including critical instream needs) in anticipation of a first flush event, and the planned review of the Extreme Events Policy. The work continued despite the decision not to progress the proactive water restriction.

The NEDEE project established the following key objectives of temporary water restrictions, which were outlined in DPIE Water's Information Sheet entitled [Northern Basin temporary water](#)

¹⁵ See the [Temporary Water Restriction \(Northern Inland Tributaries\) Order 2019](#) and the [Temporary Water Restriction \(Barwon-Darling Unregulated River and Intersecting Streams Unregulated Water Sources\) Amendment Order 2019](#).

restrictions: targets and principles, published in May 2020 (the Targets and Principles Fact Sheet):

- meet critical human needs – provide flow locally and downstream, particularly to replenish town water supply weir pools and provide water supply for domestic and stock purposes, and
- meet critical environmental needs – provide flow along the length of the river systems to ensure re-connection of rivers and drought refuge pools.

Flow targets were developed to help meet these objectives, based on the minimum environmental water requirements stated in the draft Long Term Water Plan for each valley, and other literature (where available). The targets adopted to manage the event are set out at [Appendix F](#).

The targets selected from the Long Term Water Plans (generally, base flow requirements) consisted of flows or volumes at key gauge locations relevant to important refuge areas, and some core wetland and lake habitats. They aimed to:

- maintain refugia pool water quality,
- provide some connectivity and fish passage between drying pools,
- provide low-level lake fill for fish and other aquatic biota support and maintaining lake processes, and
- inundate inner-core wetland areas for critical flow-dependent vegetation maintenance and wetland processes, where known thresholds were at risk.

Base flow targets in Long Term Water Plans are expressed as target flows for a minimum number of days per year, rather than being event-based targets. Targets can also differ between wet and dry years.

DPIE Water decided to adopt the number of flow days from the next biggest flow in Long Term Water Plans, being the time requirements for a small fresh. The flow duration for small freshes differed from plan to plan, given that the draft plans were all configured differently and based on different studies, and some state a number of days and others state how the number should be calculated. However, many plans targeted a flow duration of 10 days. This was considered achievable, but still difficult, in a drought situation.

During interagency consultation, WaterNSW also expressed concern about the ability for flow forecasting models to predict small flows and a duration of 10 days. To operationalise these targets in a dynamic and cumulative event, the relevant flow targets were converted to a volume at each site. For example, the initial baseflow requirement at Collarenebri gauge determined to meet critical environmental needs was 280 ML per day for 10 days. This was converted to a single volumetric target of 2,800 ML.

While it was recognised that one volumetric target may not provide as much ecological benefit as the flow occurring over a number of days, the adopted approach was more pragmatic, being easier to forecast and manage. The move to a single target volume, rather than a target flow rate and duration, was agreed by an interagency panel (including DPI-EES, DPI Fisheries, DPIE Water and WaterNSW) for its operational ease for this particular event.

DPIE Water formed the view that as the critical environmental need targets were (in theory) provided by a base flow, this would be enough to also supply critical human needs. The Panel was informed that in practice the volume required to re-start flows in a river is generally considered adequate to meet town, domestic and stock supplies and basic landholder rights, though no formal documentation of the volumes or numbers involved has yet been developed.

Other targets to meet water supply for critical needs

Further, although not expressly stated in the [Targets and Principles Fact Sheet](#), additional targets were developed to ensure weir pool volumes were refilled to provide basic landholder rights and town water supply. Restrictions on access to water suspended in high or general security accounts would not be fully lifted until two years' worth of supply for critical needs was assured in major dams. This approach was consistent with the usual methods of determining water availability prior to making water allocations.

Prior to the event, no precise targets were formed in relation to Menindee Lakes, as BoM forecasts, and therefore DPIE Water, did not contemplate that rainfall events would be sufficient to achieve connectivity throughout the Basin.

Principles determining the lifting of restrictions

DPIE Water also developed principles to determine whether restrictions could be lifted if a local target was reached, or forecast to be, reached. As set out in the [Targets and Principles Fact Sheet](#), these were:

- Consider providing access to upstream water users under normal rules if the nearest downstream targets are met or forecast to be met **and** there is an assessment that this event will not meaningfully contribute to meeting any downstream targets.
- However, where an event is predicted to meaningfully contribute to meeting the next downstream target, the temporary water restriction should **not** be lifted (e.g. meet Menindee Lakes requirements).
- When an event has met local targets and is no longer expected to contribute to meeting downstream targets, or is in excess of that required to meet downstream targets, some local extraction relief could be allowed.
- Temporary water restrictions should apply to a consistent upstream network of both unregulated and regulated rivers systems in a valley, to provide sufficient volumes of water to meet critical needs, avoid interceptions by extractors, and avoid inequitable sharing between users.
- Early relaxation of upstream access restrictions prior to downstream targets being met should only occur if there is high confidence in downstream flow predictions meeting targets.
- When flow predictions are used for early relaxation of restrictions on upstream access, river system loss assumptions should reflect the antecedent extended dry conditions.

Putting the NEDEE work and adaptive management provisions into practice

The mid-January 2020 rainfall event was the first occasion on which the draft frameworks outlined above were put into practice.

In order to actively manage the mid-January 2020 rainfall event pursuant to the [Temporary Water Restriction \(Northern NSW Murray Darling Basin\) Order 2020](#) made under section 324 of the WM Act, DPIE Water prepared and relied on:

- the WaterNSW Early Warning Network to directly notify affected water users of the restrictions,
- a decision tree to assist operationally monitoring, assessing and managing potential and observed rainfall and tributary flow events (see [Appendix G](#)),

-
- interim triggers based on draft environmental criteria (developed as part of the NEDEE project, which had not yet been approved at an inter-agency level) to consider access to inflows while the temporary restriction is in place,
 - an interagency protocol outlining roles and responsibilities for managing the event, particularly over a weekend, as follows:
 - WaterNSW to monitor rainfall, inflows and stream levels,
 - WaterNSW to contact DPIE-Water Director, Water Planning Implementation to advise that triggers are predicted to be met,
 - DPIE-Water Director, Water Planning Implementation to convene an inter-agency meeting to consider allowing access. Meeting to include DPIE Water, WaterNSW and DPI Fisheries,
 - If access is permitted, the Executive Director Water Policy Planning and Sciences of DPIE Water to issue advice to WaterNSW via email. Advice to include water sources where access is permitted, and
 - WaterNSW to advise customers of permission to access.

On 6 February 2020, the interim objectives, targets and principles for managing a first flush event were approved at an inter-agency meeting including officers of DPIE Water, WaterNSW, DPI Fisheries and DPIE-EES.

5.2 Communication and engagement in preparation for the first flush event

The need to protect any first flows to meet critical needs was generally discussed with communities, and in principle accepted, at drought road shows held around NSW in the second half of 2019.

As the proposal to proactively impose a temporary water restriction developed around July 2019, the concept was discussed with other agencies through the Critical Water Technical Advisory Group (including DPIE Water, WaterNSW, DPI Fisheries and DPIE EES officers), representatives of peak northern irrigator bodies and Critical Water Advisory Panels (including officers of DPIE Water, DPIE EES, DPI Fisheries, DPI Agriculture, NSW Environment Protection Authority, NSW Health and WaterNSW, and local government representatives).

Messaging was regarded as particularly important, given restrictions would apply to unregulated river users, who were not ordinarily restricted from taking water under section 324 orders.

While the proposal for a proactive restriction was not progressed in July 2019, the potential for temporary water restrictions in the north continued to be a key topic of discussion both in the northern and Lower Darling River Operations Community Consultative Committees (ROSCCOs) in late 2019, and with peak northern irrigator representative bodies in early 2020.

WaterNSW began consulting with northern valley stakeholders through its ROSCCOs on criteria for determining when the restriction should be lifted, but did not share the detail of targets or principles that had been developed.

The proactive restriction imposed over the Christmas period also demonstrated an indication of DPIE Water's intention to restrict access to first flows. The objectives for managing first flush events developed as part of the NEDEE project were outlined in the reasons for decisions published in connection with that restriction on the DPIE Water website.¹⁶ While a media release was issued in relation to the restriction, the issue was overshadowed by coverage of the 2019

¹⁶ <https://www.industry.nsw.gov.au/water/allocations-availability/temporary-water-restrictions/expired/northern-inland-tributaries>

bushfires. Anecdotal evidence suggests that water users were not directly or formally notified via customer networks, and peak bodies were not aware of this initial restriction until after it ended.

Prior to making the [Temporary Water Restriction \(Northern NSW Murray Darling Basin\) Order 2020](#) of 17 January 2020, WaterNSW sent a message to all affected water users advising them to register for notification of section 324 restrictions via the WaterNSW early warning network (EWN). However, anecdotal evidence suggests that there was still a delay between the email and text notifications (for those subscribed to the EWN) and the updating of the DPIE Water website to which those notifications directed people. There was also a 24 hour delay in SMS notifications after the restriction had been extended on 30 January 2020.

The lack of communication and engagement with the community and water users about how the first flush event would be managed was a strong source of criticism, and public feedback reinforced that there was very little pre-event communication around expected targets and scenarios, even though the implementation of the restrictions was not unexpected.¹⁷ This was perceived as unacceptable given the two years of drought conditions which preceded the event.

5.3 Preparation for the floodplain harvesting exemption and the floodplain harvesting restriction

As outlined in Chapter 4 of this draft report, the NSW Minister for Water gave in-principle approval for the drafting of the Floodplain Harvesting Exemption regulation in October 2019. The need for the regulation was identified in the 2013 Floodplain Harvesting Policy and, with particular regard to the renewed focus on water compliance, it was required to provide clarity on the legality of floodplain harvesting in NSW.

Drafting of the regulation was completed on 20 December 2019 and steps were taken to commence the regulation on 24 January 2020. A communications plan was prepared to accompany the making of the regulation, which noted that there were moderate and high risks associated with the making of the regulation.

However, the temporary water restrictions in place in January 2020 did not extend to floodplain harvesting. While some planning had been carried out as to how access to river flows would be managed to meet critical needs, very little consideration had been given to how restriction to floodplain waters would be managed. Therefore commencement of the exemption regulation was put on hold to ensure that floodplain harvesting would be temporarily restricted under section 324 of the WM Act consistent with other forms of take when the regulation commenced, and to attempt to improve the clarity of messaging around the new regulation.

In the interim, DPIE Water attempted to address practical issues around restricting floodplain harvesting, given that on-farm infrastructure was typically constructed to maximise the passive take of water flowing across floodplains.

Eventually, readiness to commence the regulation on 6 February 2020 with the corresponding temporary water restriction (commencing 7 February 2020) coincided with forecasts of possible localised and heavy storm activity in the Northern Basin.

¹⁷ See written submissions of the Menindee Lakes Sustainable Diversion Limit Stakeholder Group dated 30 May 2020, Carrington Cotton Corporation dated 3 June 2020, Cotton Australia dated 5 June 2020.

5.4 Communication and engagement in preparing for the floodplain harvesting exemption and floodplain harvesting restrictions

DPIE Water officers met with northern irrigators to discuss implementation of the floodplain harvesting policy in September to November 2019 and to clarify DPIE Water's expectation that floodplain harvesting should not be taking place without either a regulatory exemption or a licence.

DPIE Water observed a disconnect between what peak bodies had been told with regards to the permissibility of floodplain harvesting, what was being advocated to DPIE Water, and what the floodplain harvesting community more broadly knew and accepted.

DPIE Water has acknowledged that ideally it would have been preferable to consult and work with affected landholders after the regulation was drafted and before it commenced, but in the end it did not have the opportunity to do so given the readiness of the regulation coincided with rainfall events.

With regards to the temporary water restrictions, DPIE Water officers had advised some representatives of peak bodies that temporary water restrictions could be applied to prohibit floodplain harvesting. However, in addition to no advance notice being given to the broader community that certain floodplain harvesting would be exempted from licensing requirements via the regulation until the new Floodplain Harvesting Policy was fully implemented,¹⁸ no advance notice was given to the broader community that floodplain harvesting would or could be restrained by a temporary water restriction under section 324 of the WM Act.

6. Management of the 2020 Northern Basin First Flush Event

6.1 What had to be managed?

The beginning of the event in February 2020

In late January, the BoM forecast rainfall throughout February likely to be in the manner of localised storm events. Accordingly, on 30 January 2020, the temporary water restriction originally put in place on 17 January 2020, was extended to 17 February 2020.¹⁹

By 7 February 2020, the BoM predicted the possibility of heavy showers and storms across NSW for the coming days that had the potential to cause runoff and flash floods by the end of the weekend (8-9 February). While most of the forecast rain was predicted to fall on the NSW North Coast, there was the possibility of localised and heavy storm activity in the Northern Basin. The predicted rain was not likely to produce significant floodplain events across any or all of the northern NSW floodplains, but could potentially produce localised overland flow or overbank flows that could be extracted for the purposes of floodplain harvesting. See [Appendix H](#) for maps of the BoM forecasts in late January and early February 2020.

This forecast coincided with DPIE Water's readiness to commence the regulation to exempt the requirement to hold a water access licence to take water via certain floodplain harvesting works, and the corresponding temporary water restriction. In accordance with normal government

¹⁸ Submission from Nature Conservation Council dated 9 June 2020 and Healthy Rivers Dubbo dated 4 June 2020.

¹⁹ See [Temporary Water Restriction \(Northern NSW Murray Darling Basin\) Amendment Order 2020](#) and the [reasons for decision](#) published on the DPIE Water website.

processes, the regulation was submitted to the Executive Council on Friday 31 January 2020, approved by the Governor on the following Wednesday 5 February, for automatic commencement upon publication on the NSW legislation website on Friday 7 February 2020.

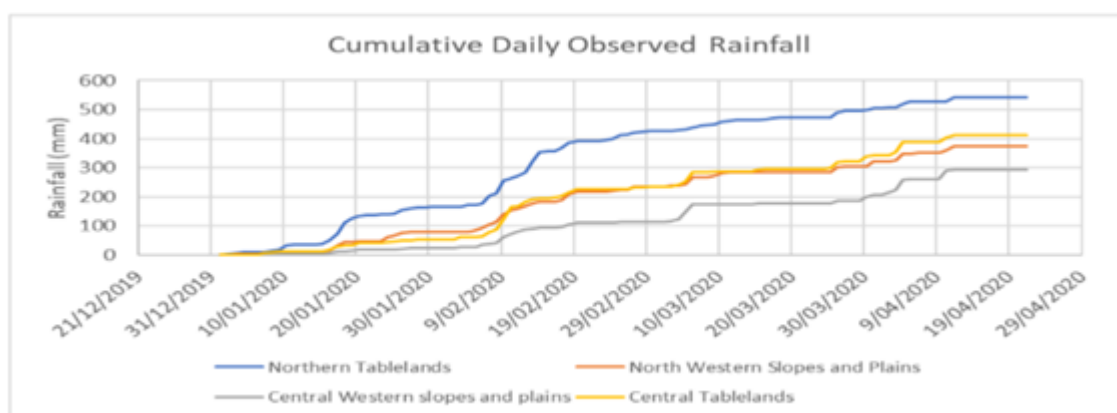
As a result, the [Water Management \(General\) Amendment \(Exemptions for Floodplain Harvesting\) Regulation 2020](#) commenced on 7 February 2020. The regulation formally permitted under the WM Act, for the first time, the take of water via floodplain harvesting without a licence by those works while the Floodplain Harvesting Policy is being rolled out. On that same date of 7 February, the [Temporary Water Restriction \(Northern Basin\) \(Floodplain Harvesting\) Order 2020](#) was made to prohibit the take of water using those floodplain harvesting works, in order to protect water for higher priority critical needs, and consistent with the other restrictions in place across the NSW Northern Basin at that time. The order did not prohibit the 'passive take' of water – i.e. the take of water by a water management work that could not reasonably be prevented (e.g. the passive take of water by on-farm storages, dams, and open channels that do not have works to control or otherwise avoid the take of water via floodplain harvesting). The order applied to the following floodplains:

- Barwon-Darling Valley Floodplain,
- Gwydir Valley Floodplain,
- Lower Namoi Valley Floodplain,
- Narrabri – Wee Waa Floodplain,
- Narromine to Oxley Station Floodplain, and
- Upper Namoi Valley Floodplain.

The order was later amended on 12 February 2020 by the [Temporary Water Restriction \(Northern Basin\) \(Floodplain Harvesting\) Amendment Order 2020](#) to extend the restriction to floodplains inadvertently omitted from the initial order, being the Lower Macintyre River, Whalan Creek, and Boomi River Floodplain (from Yelarbon Crossing to Barwon – Boomi Rivers confluence) and the Lower Macquarie Valley Floodplain.

Rainfall across the Northern Basin through to May 2020

Rainfall across the northern parts of the Basin began in late January 2020 in the upper Condamine-Balonne in Queensland and across the northern NSW tributaries. The rainfall, caused by storm cells with a large variation in rainfall intensity and location across the region, continued from January through to May 2020 (with data to late April graphed below).



Cumulative daily observed rainfall. Source: WaterNSW submission

The cumulative rainfall events led to continuous updating of flow forecasts in the northern NSW tributaries and the Barwon-Darling. The summary below sets out the rainfall events, and the

associated increase in forecast flows to Menindee Lakes, and has been prepared based on information provided to this review by WaterNSW and DPIE Water.

- From 6-10 February, rain fell across the Lower Gwydir and Namoi systems. Flows were forecast to reach Wilcannia, but not provide a resource in the Menindee Lakes.
- Over the weekend of 8-9 February 2020 in particular, localised storm events caused unexpected localised flooding across the Namoi and the lower Gwydir valley. No BoM or SES warnings had been issued in relation to flood risks in those locations prior to that weekend. Rainfall was highly variable - for example, BoM recorded 6 mm at Pillaga and 90 mm at Narrabri. Peak bodies reported that intense rain of up to 260 mm had fallen in some locations. After that weekend, flows were forecast to only just connect with the Menindee Lakes, with an inflow of 0-8 GL.
- From 12 to 14 February, rainfall continued across the northern region with a further 30-60 mm recorded at the Northern Western Slopes and Plains. By 16 February, there had been increased rainfall around the Border Rivers catchment. These events increased the forecast flows to Menindee Lakes to 15-35 GL.
- Over 18-19 February, rainfall in the range of 25-70 mm was recorded across the northern NSW tributaries and Queensland. By 20 February, the forecast flows into Lake Wetherall had increased to 60-80 GL, meeting the trigger that had been set by DPIE Water on 11 February 2020, with advice from WaterNSW, to:
 - provide flow along the Lower Darling,
 - provide connectivity in the Barwon-Darling from Mungindi to Wentworth, and
 - provide a reserve in Lake Wetherall as a refuge pool.
- Over the weekend of 22-23 February, the Maranoa River catchment area in the south western region of Queensland (in the western part of the Balonne River catchment) received significant rainfall in the range of 200 mm, leading to significant river flows in the Balonne at St George. The forecasted inflows to Menindee Lakes increased to 170-200 GL. On 5 March, this increased again to 270-295 GL following an increased flow forecast at St George, and having regard to flows from the Bokhara and Warrego.
- On 6 March, additional rain was recorded on the North Western slopes, the Central Western slopes and plains and the Central tablelands of NSW. As a result, forecasted flows to Menindee Lakes increased to 260-315 GL on 16 March.
- On 20 and 31 March, further rainfall events in the Northern Western and Central regions increased forecasted inflows to Menindee Lakes to 365-405 GL.
- On 4 and 11 April, rainfall events saw an additional 40-55 mm of rainfall in the north and Western slopes, and over 100mm on the Central Western slopes of NSW. By 31 April, the Menindee Lakes forecast increased to 485-535 GL.
- At the start of May, another 40-50 mm of rain was recorded across the Central West. By 1 June, forecasted flows to Menindee Lakes reached 578-590 GL.

As the sequence of events above demonstrates, the 2020 Northern Basin First Flush event was very dynamic in nature, having regard to both the various temporal and spatial rainfall patterns as well as the stress that had been placed on the physical and social environment by the extended drought throughout the system. A chronology of the decisions made to manage the event is set out at [Appendix I](#).

6.2 Who was involved?

Although section 324 of the WM Act gives the Minister the power to make temporary water restrictions, that function is also delegated to DPIE Water officers.

Depending on the context in which the need for a section 324 order arises, other government agencies may also provide advice to DPIE Water in relation to the making of a temporary water restriction. For example:

- WaterNSW may provide advice to DPIE Water on resource availability, water demands and flow forecasts,
- the CEWH and/or DPIE-EES may give advice in cases if a section 324 order is being made for environmental purposes, or especially if held environmental water entitlements are involved, and
- DPI Fisheries may give advice on the potential impacts on fish populations.

NRAR are responsible for monitoring and compliance activities, and WaterNSW are generally responsible for notifying water users of water restrictions once they have been made.

When forecasts indicated the possibility of rainfall, DPIE Water informed the Minister of the general intention to protect the first flows before imposing the first temporary water restriction and then DPIE Water officers exercised all decision-making responsibilities to manage the event. The Minister was notified of decisions after they were made.

Management of the 2020 Northern Basin First Flush event was as follows:

- **DPIE Water** delegated officers made all decisions in relation to managing the Northern Basin First Flush event, having regard to the advice of other officers when required (e.g. regarding floodplain harvesting),
- the **Minister** was notified of decisions after they were made but was not involved in the decision-making process,
- **WaterNSW** routinely provided forecasting advice (including BoM forecasts and flow forecasts) to the DPIE Water decision makers,
- **DPI Fisheries** routinely provided advice to the DPIE Water decision makers regarding the watering needs of fish habitat along the river,
- **DPIE-EES** provided, on request only, advice to DPIE Water about supplementary take and needs of priority environmental sites,
- **NRAR** was routinely notified of decisions after they were made to enable them to undertake monitoring and compliance activities as required, and
- Both **DPIE Water** and **WaterNSW** routinely took a variety of steps to notify water users of decisions after they were made.

Notably, DPIE-EES were not routinely included in the decision-making process because of a concern that DPIE-EES could have a perceived conflict of interest, given they participate in the water market as the NSW Environmental Water Holder and temporary water restrictions have the potential to be market-sensitive, and have a material effect on the price or value of water access rights. For example, a restriction that prohibits water from being taken until the end of a water year would devalue the price of a water right that had to be exercised within that year. Therefore DPIE-EES' involvement was limited to development of the principles and triggers for managing the event (as outlined in section 5.1 of this draft report).

6.3 How did they manage the event?

The temporary water restrictions and active management provisions

The 2020 Northern Basin First Flush event was essentially managed under two temporary water restrictions made under section 324 of the WM Act (and amended under the same section throughout the course of the event):

-
- [Temporary Water Restriction \(Northern NSW Murray Darling Basin\) Order 2020](#) which prohibited the take of water in northern NSW water sources by certain regulated and unregulated licence holders (the **pumping restriction**)
 - [Temporary Water Restriction \(Northern Basin\) \(Floodplain Harvesting\) Order 2020](#) which prohibited certain takes of water using floodplain harvesting works in certain northern NSW floodplain areas (the **floodplain harvesting restriction**).

Each restriction included provisions to enable active management of water take. In both cases, take was prohibited unless otherwise approved by the Director, Water Planning Implementation or Executive Director, Policy, Planning and Sciences within DPIE Water, through a lifting of the restriction for a certain period.

Under the pumping restriction, the Director was *required* to approve the take of water for the period during which the Director was satisfied that there was, or was forecasted to be, sufficient water available for higher priority needs (Schedule 1, clause 1, 2 of the Order).

Clause 5 (1) of the Order stated “**higher priority needs** includes the requirements for the water source and its dependent ecosystems, basic landholder rights and higher priority access licences (including town water supply).”

The floodplain harvesting restriction provides that the Director *may* approve the take of water if in his or her opinion there was, or was forecasted to be, sufficient water available for higher priority needs (Schedule 1, clause 1, 2 of the Order).

Clause 5 (1) of that Order stated “**higher priority needs** includes the requirements for the relevant water source, or part of the relevant water source, and its dependent ecosystems, basic landholder rights and access licences (including town water supply) of a higher priority to floodplain harvesting (regulated) access licences and floodplain harvesting (unregulated) access licences.”

On 5 February 2020, a workflow process similar to that used to manage the January restriction was established to manage the forecasted rain event over the weekend of 8-9 February 2020. The same process was subsequently used throughout the event.

1. WaterNSW to monitor rainfall, inflows and stream levels.
2. WaterNSW to contact DPIE-Director Water Planning Implementation to advise that triggers/targets are predicted to be met.
3. DPIE-Water Director, Water Planning Implementation to convene an inter-agency meeting (DPIE and WaterNSW) to consider allowing access to specific surface water flows. This meeting was to include DPIE Water, WaterNSW and DPI Fisheries.
4. If access was permitted, the Executive Director Water Policy Planning and Sciences DPIE Water issues advice to WaterNSW via email. Advice to include water sources where access was permitted.
5. WaterNSW to advise customers of permission to access.

In implementing this process, from the period of 8 February 2020 until 17 April 2020, key personnel from DPIE Water, WaterNSW and DPI Fisheries staff met to discuss management of the restrictions whenever forecasting indicated that targets would be met, or as required to discuss representations from water users or communication issues. This occurred at least every day throughout February, and sometimes multiple times each day.

On each occasion, a routine process was adopted whereby the interagency group:

- reviewed the operating principles (as outlined in section 5.1 above and set out in the [Targets and Principles Fact Sheet](#)),

-
- applied the operating principles to the forecast and other information before them in relation to the triggers and targets, and
 - jointly recommended a management action(s) to the delegate making the decision.

Despite the differences in the lifting provisions between the pumping restriction and the floodplain harvesting restriction, the same objectives, principles and flow targets arising from the NEDEE project and finalised on 6 February 2020 were used to decide whether or not a restriction should be lifted.

Overview of the WaterNSW modelling and forecasting

As outlined above, one of WaterNSW's roles throughout the event was to manage and undertake river modelling and to forecast flows during the advice period. This advice would confirm or otherwise whether the targets designed to ensure that critical human and environmental needs would be met.

WaterNSW relied on its Computer Aided River Management (CARM) operational model throughout the event. The model has been developed across NSW in the rural space over the past 3 years and Barwon-Darling since 2018. The CARM models have updated older CIARO models that have been used since the early 1990's, while still incorporating the data of the CIARO models. Prior to use of this model, a range of similar approaches were used on an ad hoc basis to forecast Menindee Lakes inflows, with inconsistent results.

The main source of data for this flow forecasting model is NSW river flow data from gauging stations in 14 river zones across NSW. The model calculates travel times and estimates increases and decreases of flows between gauges (based on key events in the past 10 to 20 years).

Other data which was input to the model, when available and sufficiently accurate, includes:

- weather and rainfall forecasts from the BoM,
- Queensland river flow data from the Queensland Government's Water Monitoring Information Portal,
- extraction data based on pump capacity and flow class,
- locational flood height forecasting from the BoM,
- field observations through a range of channels including field staff, customers and communities, and
- floodplain data from the DPIE and satellite imagery from Sentinel.²⁰

Throughout the 2020 Northern Basin First Flush event, WaterNSW generally re-ran and updated its model on a daily basis as flows and forecasts changed.

Although Water NSW considers that its data sources and models performed reasonably well through a difficult and dynamic event, the event did expose some gaps relating to data regarding:

- Queensland flows,
- floodplain harvesting flows, extraction and in-river flows,
- extraction from unregulated systems,
- flow behaviour during extreme events, including with regard to channel capacity and distribution efficiency, and
- the contribution of flows in certain river reaches or floodplains to instream or downstream targets.

²⁰ Written submission from WaterNSW dated June 2020.

In some cases, landholders and other stakeholders reported (and provided photographic evidence of) observed conditions in these unmonitored areas, which was used to assess information being recorded in the WaterNSW monitoring network.

Difficulties in forecasting Queensland flows into NSW

The Condamine Balonne system can provide significant inflows to the Barwon-Darling. However, WaterNSW had difficulty forecasting how much, if any, Queensland flows would reach NSW.

Queensland flow forecasts were not relied on to determine what NSW was likely to receive by way of inflow, because the percentage of the water that flows past St George into the NSW system has been shown to vary significantly for the same water volume at St George. For example, since the 1950's, the percentage of water recorded at the bottom of the Culgoa has ranged from 8% (1993) to 48% (2009). WaterNSW advised that a flow of 380 GL at St George in both 1973 and 2016 resulted in flows at Collerina of 298 GL (78%) and 84 GL (22%) respectively.²¹ This variation in NSW inflows in previous events in addition to the complex river network, long travel time, and expansive floodplain, made forecasting during the 2020 First Flush event particularly challenging. Further, while WaterNSW was aware of rainfall occurring in the system, and that Queensland irrigators were permitted to extract water in accordance with Queensland's accredited water resource plans, it did not have information as to the likely volume of the extractions.

In light of these difficulties, WaterNSW conservatively estimated flows from Queensland in its forecasting, which was the subject of criticism throughout and following the event from some water users. In particular, during the event, Namoi Water submitted flow forecasting of volumes almost twice those of WaterNSW.²² In the end, the total flow from the Culgoa was in the order of 170 GL, which was 12% of the flow recorded at St George. This was only slightly higher than that forecast by WaterNSW (which was 10% of the flow recorded at St George).²³

The Panel endorses WaterNSW's view that in order to improve the forecasting of flows coming across the border during these events, it needs to build greater formal cooperation with Queensland river operators and consider developing protocols to assist in the timely exchange of relevant information during first flush events.

NSW water extraction data

Currently, NSW water extraction data is based on pump capacity and flow ratings (the maximum permissible amount for the maximum permissible time), rather than real-time data.

As was identified in Ken Matthews' [Interim Report](#), arrangements for metering, monitoring and measurement of water extractions, especially in the Barwon–Darling river system, have not historically been at the standard required for sound water management and expected by the community.

While new metering arrangements (including telemetry for surface water take) are currently being rolled out across NSW, real time data was not available during the 2020 Northern Basin First Flush event. Metering in the Northern Basin is anticipated to be completed by 1 December 2020 for surface water meters with a pump capacity above 500 mm, and 1 December 2021 for the remainder of eligible meters in the northern inland region.

²¹ Written submission from WaterNSW dated June 2020.

²² Written submission from Cotton Australia dated 5 June 2020 and NSW Farmers dated June 2020, Carrington Corporation dated 3 June 2020, Border Rivers Food and Fibre dated 7 June 2020 and written submissions from Josh & Mel Hatton, Nicole McGinnity, Josh Schwager, Andrew Watson, Susan Wright and Andrew Carberry.

²³ Written submission from WaterNSW dated June 2020.

Floodplain harvesting data

During the event, significant volumes of water flowed off the floodplains surrounding the tributaries of the Barwon-Darling. However, floodplain flow and extraction data is scarce. Due to the lack of gauging stations on the floodplain, DPIE Water and WaterNSW have a limited real-time understanding of the floodplain resource from what falls on the floodplain to what makes it into the rivers. As a result, the risk that some properties could incur damage when floodplain harvesting activities were restrained, without actually contributing to the objective of the restriction, was poorly understood.²⁴

This type of data has been described by floodplain harvesting experts of DPIE Water as the 'holy grail' of information, given the dynamics of flood waters, the limited technology currently available, and the costs and resources that would be required to obtain this data.

WaterNSW also has few gauging stations on some unregulated tributaries feeding into the Barwon-Darling system, which made it difficult to forecast water flowing to those unregulated tributaries and off their catchments. Without a good understanding of the flows across the unregulated catchments and the floodplains, WaterNSW could not include such flows in the forecast model until it was identified at streamflow gauges.

WaterNSW has advised that it is currently pursuing development of hydrodynamic models of the Barwon-Darling river system, using detailed topographic data to improve understanding of channel dynamics/storage and floodplain flow, and that this model will improve the understanding of flow from the floodplain.

Flow behaviour, including during extreme events

There was also a limited understanding of the extent to which the flows in some unregulated systems would contribute to meeting downstream targets, particularly during extreme events. This meant that the general 'blanket' approach to applying water restrictions which had to be adopted, had a high cost to some water users relative to their contribution to meeting the objectives of first flush management. Further, once a natural flow has passed an unregulated licence holder's extraction point, there is no longer a physical opportunity to extract water. This means that decisions about making or lifting restrictions in such catchments needed to be especially timely.

Prior to the event, DPIE Water designed a decision tree to assist monitoring, assessing and managing potential and observed rainfall and tributary flow events, including consideration of physical constraints (see [Appendix G](#)). However, the actual forecasting and decision-making reflected a limited understanding of how some rivers operate at higher flows, having regard to weir pool and channel capacity. During the event, in some parts of the river system, water left and re-entered the main channel at different parts, affecting flow forecasting.²⁵ Particular concern was raised by stakeholders that, when flows exceeded channel capacity downstream of Goondiwindi, water was redirected to Queensland for extraction over the border,²⁶ and that more active management in the Gwydir could have enabled overbank flows to be diverted to the wetlands and taken under supplementary access licences without compromising flows to the Barwon-Darling.²⁷

²⁴ Written submission of WaterNSW dated June 2020. See also written submissions of Doug and Megan Marshall and NSW Irrigators Council dated June 2020.

²⁵ Written submission of WaterNSW dated June 2020.

²⁶ Written submission of Border Rivers Food and Fibre dated 7 June 2020.

²⁷ Written submission of Mark A Winder dated June 2020.

WaterNSW proposes to carry out a more detailed analysis of historic events to enhance its understanding of regulated river and unregulated tributary behaviour during extreme events and operational data inputs and to improve its ability to accurately model and manage future events, including weir pool capacity and initial recharge, channel breakouts and identified backwater locations.

However, the Panel recognises that these are natural systems that change over time and in response to different types of flow events, and that there will be costs involved in making these improvements. There will always be uncertainties and inaccuracies in quantifying this water flow. The water management approach taken needs to recognise and have regard to these uncertainties and inaccuracies in a transparent way.

6.4 Unexpected developments during the event

The temporary lifts of restrictions on Floodplain Harvesting

One matter which raised considerable concern in relation to the event by environmental and floodplain grazing stakeholders and members of Lower Darling communities, in particular, was the temporary lift of the floodplain harvesting restriction:

- in relation to the Gwydir Valley Floodplain within the Mehi and Thalaba unregulated water source, from 9 to 12 February, and
- in relation to the Lower Namoi Valley, Gwydir Valley Floodplain and the Mehi, Thalaba and Barwon water sources of the Barwon-Darling Floodplain, from 10 to 13 February.

Both the floodplain harvesting regulation and the floodplain harvesting restriction commenced on Friday 7 February 2020. As outlined above, although weather forecasts had identified the possibility of localised and heavy storm activity in the Northern Basin that could lead to overland flow and localised flooding, the predicted rain was not considered likely to produce significant floodplain events across any or all of the northern NSW floodplains.

Over the weekend, DPIE Water and the Minister's office received representations by water users which stated that they faced significant infrastructure damage arising from the prohibition on floodplain harvesting. Photo evidence was sent to WaterNSW and DPIE Water which showed flooding of properties and waters breaking over roads/storage walls.²⁸

For DPIE Water and WaterNSW, the situation was complex for a number of reasons:

- as it was the first time that floodplain harvesting was also restricted, there was no understanding of likely flow patterns in circumstances where floodplain harvesting was prohibited,
- the localised storms meant that rainfall was extremely heavy in some areas, and non-existent in others. No sources of measurement were installed. DPIE Water and WaterNSW did not have many local staff available to provide on-the-ground information, and therefore had to rely on representations from water users, and
- there was a highly unusual pattern of rainfall and runoff. In most circumstances, water reaches the floodplains following the spilling from flowing rivers where the rain has occurred higher in the catchment. In this case, water was falling on the floodplains and dispersing.

DPIE Water experts in floodplain harvesting provided information regarding the magnitude of extraction that could be expected if restrictions were lifted, and how it might affect downstream flows. But given that floodplain water extraction management is still in the process of being implemented by the NSW Government, despite having data relating to the potential rate of

²⁸ Written submission of WaterNSW dated June 2020. See also written submission of NSW Irrigators Council dated June 2020.

floodplain harvesting take, and when and how properties may take water, DPIE Water and WaterNSW lacked the tools to properly understand the impact of floodplain harvesting and the return of water from floodplains back to rivers. Neither WaterNSW or DPIE Water had access to any independent, on-ground information.

In response to the claims of infrastructure damage, DPIE Water weighed up the following factors:

- local targets were being met,
- given the unexpected and localised nature of heavy rainfall, there was no clear evidence that rainfall would meaningfully contribute to meeting downstream targets,
- there was insufficient time to properly investigate claims of risks to life or property,
- the amount of water that could be potentially taken during the time required to investigate the claims,
- the time required to clearly signal and communicate permissions or restrictions to affected landholders, and
- the potential consequences if the alleged risks to life or property were correct, keeping in mind infrastructure had been set up to optimise the take of water, so it was unclear what risks and damage would arise by preventing them from taking water.

In consideration of these factors, on the advice of the interagency group, the DPIE Water decision-maker decided to temporarily lift the floodplain harvesting restriction from 9-12 February in some areas, and from 10-13 February in others, in order to mitigate threats to life or property while it investigated those claims.

On 11 February, an NRAR chartered plane surveyed the affected areas to validate the hydrology models being used in relation to the event, given the event was novel and the models rely on assumed circumstances. NRAR officers sought to physically observe how the water was moving through the watersheds, make observations of properties that might be in breach of the restrictions, and at the same time, take note of any observable infrastructure damage.

NRAR's assessment (see [Appendix J](#)) indicated that minimal evidence of infrastructure damage was observed.²⁹ On that basis, DPIE Water allowed the temporary lifts on restrictions to lapse after three days.

Community members who welcomed the initial restrictions on floodplain harvesting quickly raised concerns about the lack of transparency regarding the process and justification which allowed the restrictions to be lifted, and the volume of floodplain harvesting extractions during that temporary period.³⁰

DPIE Water's [website](#) includes the following information in regards to floodplain harvesting volumes:

During the event we monitored water captured in eligible farm storages across the Northern Basin. We used remote sensing technology (satellite imagery) to observe the presence of water, and in combination with storage curves, to estimate storage volumes.

There are approximately 1,400 floodplain harvesting storages in the Northern Basin floodplains of the Border Rivers, Gwydir, Namoi, Macquarie and Barwon-Darling valleys. If full, these storages could hold a volume of 1,300 GL. At the start of February these storages held an estimated 21 GL, by mid-February 51 GL and by the end of April 243 GL. We therefore estimate an increase in stored water of approximately 220 GL between February to April 2020. This includes an

²⁹ The Panel notes that survey comments indicated that flooding caused significant fencing, infrastructure, soil, and mechanical damage in some cases.

³⁰ Written submissions from each of the Menindee Lakes Sustainable Diversion Limit stakeholder group, the Lower Darling Horticulture Group and Sarah Moles dated June 2020.

estimated 30 GL by mid-February, during which there were four days when restrictions on floodplain harvesting were lifted in specified areas.

It is important to note that:

- *the stored volumes are derived from remote sensing information, rather than directly measured. They are estimates only. We have used assumptions and there is scientific uncertainty in the results. Future telemetry and measurement of floodplain harvesting will improve how we quantify floodplain water take.*
- *the analysis captures the change in volume of water held in storages and does not identify the individual sources contributing to this stored water. This stored water might be from direct rainfall, on-farm runoff/tailwater capture, harvesting from floodplains or pumping from rivers and aquifers.*

To estimate the stored volumes, we used the method below. This process was repeated three times to represent pre-, mid- and end-of-event stored water volumes.

Adoption of Menindee Lakes Targets

As indicated in Chapter 5 of this draft report, when the rainfall event began in early February (and in planning for the event throughout 2019) there was no expectation by the NSW water agencies that flows would reach Wilcannia, let alone the Menindee Lakes.

When that possibility became apparent, DPIE Water undertook work to determine the minimum volume that would be required for a first flush event down the Barwon-Darling. It determined that 60-70 GL would enable a release of water along the full length of the Lower Darling River to Wentworth. Approximately 20 - 30 GL was required to replenish the dry river bed, flush out pools with poor water quality and top up within-channel storages behind temporary weirs. 40 GL was needed within Lake Wetherell to provide a water supply reserve for the township of Menindee and a drought refuge if dry conditions returned. That target was made publicly available on 24 February 2020, via the release of a fact sheet on the DPIE Water website.³¹

However, as the rainfall continued, and larger flows to Menindee became achievable, that target was revised to 200 GL, being the amount estimated as being required to meet 12-18 months' supply for critical needs, and generally consistent with the reliability of targets for dams in upstream water sources. This was made public via another DPIE Water fact sheet published online on 5 March 2020.³² A full two years' supply was not targeted due to operational complexities (such as spill risks and evaporation rates) associated with the Menindee Lakes.

Supplementary Water Announcements

According to the DPIE Water Factsheet,³³ the Macquarie Marshes is a Ramsar listed wetland of international importance covering 19,850 hectares which lies 100 kilometres north of Warren in central west NSW. The Marshes are one of the most important nesting sites for waterbirds in Australia and the largest reed bed in the Murray Darling Basin.

Wildfires caused by a lightning strike in October 2019 burnt around 3,000 hectares of the reedbed and some adjacent river red gum woodland. While the reedbed had resprouted from

³¹ Available at https://www.industry.nsw.gov.au/__data/assets/pdf_file/0004/290731/River-and-overland-flows-in-the-northern-Basin-fact-sheet.pdf

³² Available at [fleshed out, eg. on the basis of remote sensing technology \(satellite imagery\) to observe the presence of water, and in combination with storage curves, to estimate storage volumes. The volume estimation method is in the updated text at https://www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/managing-drought-recovery/north-west-flows-in-early-2020](https://www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/managing-drought-recovery/north-west-flows-in-early-2020)

³³ Available at https://www.industry.nsw.gov.au/__data/assets/pdf_file/0005/296465/macquarie-marshes-drought-recovery-fact-sheet.pdf

subsequent rainfall, it still needed inundation to replenish the root zones and ensure continued growth of the reeds.

In February 2020, flows entered the Macquarie in several events through the Bell, Little and Talbragar Rivers downstream of Burrendong Dam. By early March 2020, some 7 GL had been measured at Pillicawarrina. This inundated a small part of the critical northern reedbed area. Some of this water was diverted for stock and domestic replenishment of the lower Macquarie River.

However, the increased watering requirements for the Marshes arising from the recent fires were not reflected in the Long Term Water Plans which had been used to form the interim targets being used to manage the First Flush event which, in relation to the Marshes, required a volume of 60 GL. According to the interim principles being used to manage the event, the target was not going to be met. Accordingly, some supplementary access was allowed from 20 February 2020 consistent with ordinary operational processes. Some 12 GL was subsequently extracted from the peak of the flow, reducing the extent of inundation of the reed beds. The value of the peak of the flow to the environment was exponentially higher than the same volume of subsequent inflows at lower daily flow rates, as the area of wetland that potentially could have been inundated by the first flow was greatly reduced.³⁴

Following supplementary access, staff from DPIE EES and local landholders within the Ramsar wetland contacted DPIE Water advising that flows were critically required, given the fires and extended dry conditions.³⁵ DPIE EES advised that a minimum volume of 30 GL over 3-5 months was required to meet a critical water demand (including for an area that would be inundated to a different extent, compared to the case where the target was 60 GL).

Having regard to this advice, when further flows were forecast to reach the wetlands in March, supplementary access was not allowed. With the benefit of the February flows which had helped 'prime' the streams and wetlands of the Southern Marshes (allowing more efficient transmission of follow-up flows through to the Northern Marshes) the March flows increased the total flow into the Marshes in three months to around 18 GL.

When further flows occurred during the first week of April, it was forecast that 32 GL would arrive at Pillicawarrina by 23 April 2020 and that allowing some supplementary access would reduce the total by only 0.4 GL. Accordingly, supplementary access was permitted from 5 April 2020 to ensure the 30 GL target would not be compromised. With the further rainfall over Easter, by 15 April 2020 the cumulative flow at Pillicawarrina was 30.7 GL and it reached 37.7 GL by 20 April 2020.³⁶

6.5 Communications throughout and following the event

Communicating notice of the making and lifting of restrictions

Prior to the event, DPIE Water and WaterNSW considered their communication systems were adequate to convey information on restrictions and any lifts to affected water users (although they did not anticipate that the 2020 First Flush event would be as dynamic, complex or significant as it turned out to be).

A communications plan was developed at the same time temporary water restrictions were prepared (so in relation to the temporary water restrictions made on both 17 January 2020 and 7 February 2020). This plan adopted the usual methods of communicating all temporary water restrictions and focussed on meeting the legislative requirements for making and commencing

³⁴ Written submission from Healthy Rivers Dubbo dated 4 June 2020.

³⁵ See written submission of Garry Hall dated June 2020.

³⁶ More information is available at https://www.industry.nsw.gov.au/__data/assets/pdf_file/0005/296465/macquarie-marshes-drought-recovery-fact-sheet.pdf.

temporary water restrictions under section 324 of the WM Act. Notably, the plan did not include any procedures for communicating when restrictions were lifted via approvals to take, nor communications to other government agencies. Additionally, WaterNSW's Early Warning Network did not include floodplain harvesters unless they had signed up because they owned other irrigation licences.

The plan identified the following channels to be used in managing the event:

When restrictions were imposed	When restrictions were amended or revoked
Media release	Media release
DPIE Water website update	WaterNSW customer service notice to affected licenced water users (not community at large)
WaterNSW customer service notice to affected licenced water users (not community at large)	Newspaper advertisement
Newspaper advertisement	DPIE Water website update
DPIE Water Twitter	

While the communications plan included clear questions and answers regarding the restrictions, the actual communication products did not necessarily reflect this.

WaterNSW led communications to water users throughout the event, using a mix of electronic and traditional media channels. However, both WaterNSW and DPIE Water have reflected that the event confirmed that not all of its channels are well suited to incident management and the incident management communication capability can be improved. Further, some channels (e.g. newspaper advertisements) are becoming rapidly obsolete, in particular for regional NSW.

To illustrate, BoM briefings to Water NSW generally occur on Wednesdays. Therefore, when adopting an events based approach to imposing water restrictions, a restriction will typically only be ready to commence (after information has been assessed, the order has been prepared, and is ready to be gazetted) on a Friday.

There is generally limited daily media coverage in regional areas. Regional radio (ABC) is the only real-time media option in rural areas to notify local areas of rule changes taking immediate effect. However, the deadline for weekend media coverage is lunchtime on Fridays, meaning there is virtually zero locally generated media coverage available until Mondays.³⁷ This imposes significant limitations in relying on traditional print, television or radio to communicate urgent information to communities.

Use of the Early Warning Network

The primary channel to communicate the making and lifting of restrictions through the event to water users was the WaterNSW Early Warning Network, or EWN. This is an automated notification system initially set up to notify the public of dam and supply activities, and also used to alert customers of potential supplementary access events. Members of the public must register for the service, and nominate the type of notifications they would like to receive. Registered users are sent notifications by SMS, email or telephone according to their selection.

However, many water users (especially unregulated system licence holders and currently unlicensed floodplain water harvesters) were unaware of the EWN and its role in keeping people up to date prior to the event. And while there was a significant increase in registrations across the Northern Basin during the event, the initial EWN notifications only reached a relatively small percentage of customers, who were left relying on traditional media channels or peak body membership for information. In the survey conducted for the purposes of this

³⁷ WaterNSW written submission dated June 2020.

assessment, 30% of participants found out about water restrictions through peak membership groups, while only 15% found out via the EWN.

As noted above, of particular relevance to the event, floodplain harvesters and unregulated river users were far less likely to be aware of the EWN service or be a member of a peak body, but also the most likely to be directly affected by water restrictions associated with the event.

Information available on the DPIE Water and WaterNSW websites

A range of information was also available on the DPIE Water and WaterNSW websites. DPIE Water's website was updated with copies of the temporary water restrictions, the approvals to take (lifting orders), and reasons for decisions. Often, EWN notifications directed members of the public to these documents. However, the decisions were not drafted in a way that enabled the public and many water users to easily understand what they could or couldn't do. For example, designated floodplain maps issued to clarify where floodplain harvesting restrictions applied did not contain sufficient detail for landholders to identify where their property was located.

Fact sheets were also published on the DPIE Water website at various dates during the event, which summarised details of rainfall and flows to date, and outlined the rationale for imposing, maintaining and lifting temporary restrictions at various points. While they are useful documents, their timing was unpredictable and they are not easily found on the DPIE website.

Throughout the event, water operation updates were regularly published (up to every two days) on the WaterNSW website, as well as weekly water availability reports. Supplementary announcements were made and published on the WaterNSW website and notified to relevant water users via the usual means. Members of the public could subscribe to automatic email notifications of the same updates and water reports via the WaterNSW website, but only if they knew about this service in advance.

The WaterNSW website also includes an interactive real-time data map, which includes real-time data on the height and flow of rivers, storage capacity of dams and reservoirs, meteorology and rainfall.

WaterNSW's mobile phone application "WaterLive" is linked to that real time data. However, during the event, traffic to the real time data website increased from an average of 1,000 hits per day to 10,000 hits per day, as stakeholders sought to understand what flows were coming into the system. This caused the database to exceed its maximum capacity, crashing the website and app.

Point of contact for enquiries during the event

There was no single clear point of contact identified for questions about the restrictions or lifts in relation to the event, or a person or agency who had been assigned with this responsibility before the event. As a result, stakeholders commented to the Panel that enquiries were shuffled back and forth between WaterNSW, DPIE Water, the MDBA, the CEWO and DPIE EES. Water users and landholders heavily relied on peak bodies to get information.

Peak body representatives relied on contact details of agency staff obtained prior to the event in relation to unrelated water matters to directly speak to and email decision-makers who were simultaneously trying to manage the event. This meant that both agency staff and staff of peak bodies had to be available and working at all hours of the day, nights and weekends for briefings to give and receive advice. This caused all parties significant stress, not least because some callers were particularly agitated about the unfolding events.

The absence of a central point for media enquiries added another level of confusion, misinformation and stress.³⁸

Communication with other government agencies throughout the event

Officers in agencies directly involved in managing the event (DPIE Water, WaterNSW and DPI Fisheries) generally described the communication between those agencies as one of the most collaborative water experiences in their careers. Queensland, the MDBA and CEWO were notified of the general approach that would be taken to first flush management, and kept abreast of significant developments, through the recently established Northern Basin Environmental Working Group. Other Basin State agencies were not directly notified or updated about events.

There was no structured communication between NSW and Queensland in regards to flows coming across the border, except in relation to the Border Rivers via the Border Rivers agreement and Commission. While DPIE-EES provided advice at certain points during the event, it was not always clear to them how or whether this advice was taken into account.

All government agencies agreed that a more structured approach to communications would be beneficial.

Development of communications throughout the event

A more comprehensive communication plan was put into place in managing the re-commencement flows from the Menindee Lakes into the Lower-Darling. In March, communication procedures were prepared in advance of releases, outlining the type of information that would be made available, how that information would be made available, and when it would be made available. These were sent to members of the Lower Darling Critical Water Advisory Panel and DPIE Water stakeholders on email lists for the Menindee Lakes and Lower Darling in late March 2020. This resulted in more timely information being provided to interested parties in the south of the Northern Basin.

Public feedback on communications

Public feedback received in the course of this assessment overwhelmingly indicated that the community did not believe that communication of the restrictions, and their lifts, was accessible, timely or clear. Further, because detail about the targets and principles for managing the event had not been made publicly available until May 2020, there was a strong perception in the community that decisions were inconsistent (particularly given the only target disclosed was later adjusted upwards), based on nil or flawed logic or evidence, and / or the subject of undue influence or political intervention.

Both survey and written submissions expressed frustration at the unreliability of EWN alerts, and the sign up for the EWN not being simple.³⁹ Communications throughout the event were also targeted to extractive water users. Very little resources were applied to communicating to Traditional Owners and the broader community, who were also directly affected by the event. This not only limited the opportunity for indigenous communities to make the most of the cultural uses and values the event was trying to promote, but also meant the opportunity to celebrate the outcomes of the event was lost.⁴⁰

³⁸ See example in the Healthy Rivers Dubbo submission dated 4 June 2020.

³⁹ Written submission of Alan & Kym Redfern dated June 2020 and comments in survey responses.

⁴⁰ Interviews with the Gomeroi Native Title Applicant Group and the Ngemba Native Title Applicant Group.

Communications regarding floodplain harvesting when the regulation and restriction commenced

When the floodplain harvesting regulation was made and commenced on Friday 7 February 2020, there was no direct notification to landholders or communities who were directly or indirectly affected by the regulation. Although a media release was prepared, it was not issued.

On the same day, the floodplain harvesting restriction commenced by publication in the NSW Government Gazette and a [media release](#) was issued by WaterNSW and published on their website, and sent to the media at around 4pm. Notifications were sent to subscribers of the Early Warning Network between 4pm and 5.30pm. This was the first time that landholders had directly received a notice concerning the implementation of temporary water restrictions on floodplain harvesting.

Following complaints, meetings were organised by peak irrigator groups for the morning of Saturday 8 February. The groups required an explanation of the floodplain harvesting restriction and demanded communication channels be set up for stakeholders, including DPIE Water staff mobile contact details. A [fact sheet](#) was quickly prepared to clarify the effect of the restrictions and this was emailed to peak bodies and distributed via the Early Warning Network on the same day at around 1pm. A dedicated email address was set up by DPIE to answer specific queries on Tuesday 11 February 2020.

Imposing the floodplain harvesting restriction only hours before intense rainfall commenced in some parts of the Northern Basin led to confusion and stress for landholders, whose farm infrastructure was preset for normal water harvesting conditions and who had not been given adequate notice to consider and implement measures to minimise the impacts of complying with the floodplain harvesting restriction.⁴¹

Communication of the objectives, targets and principles of managing the first flush event

The objectives for first flush management were outlined in the reasons for decisions published in connection with each of the temporary water restrictions on the DPIE Water website. They were later made explicit [Targets and Principles Fact Sheet](#) published in May 2020.

However, neither the principles nor the flow targets were made publicly available throughout the event, despite requests from stakeholders. At the time, the DPIE Water chose not to publicly release the principles or targets:

- because this was the first time such targets had been developed, and
- so that the targets could be adjusted, if found to be inappropriate (as DPIE decided was necessary in relation to the Macquarie Marshes).

DPIE Water was also concerned that if the targets were released, they would not have sufficient resources to both discuss the targets and their development with stakeholders, and effectively manage the event.

Only one target was disclosed during the event, being the target relating to Menindee Lakes. As outlined in section 6.4 of this draft report, it was subsequently adjusted upwards.

On 24 February 2020, DPIE Water released a [fact sheet](#) stating that flows were forecast to enable a target of 60-70 GL in Lake Wetherell to be met. That gave water users an expectation that restrictions would be lifted once that target had been met, but on the same day, the WaterNSW Operations Update stated that 85-105 GL was expected to reach Lake Wetherell by 15-27 March 2020. On 5 March 2020, DPIE Water released another [fact sheet](#) updating that

⁴¹ See written submission of Doug and Megan Marshall and Alan and Kym Redfern both dated June 2020.

target to 200 GL, having regard to further flows from Queensland. This was overwhelmingly seen by stakeholders as a 'changing of the goal posts'.⁴²

Not releasing detailed information about the objectives, principles and targets caused a lot of confusion and anger, and significant resources were still diverted to managing stakeholder concerns. Those burdens fell on individual officers and decision-makers, who were already under significant pressure in trying to manage the dynamic event. DPIE Water has acknowledged that, in hindsight, it may have been better to release the targets and principles, rather than appear to be working without any framework for decision-making.

Communications following the event

Public feedback received in the course of this assessment demonstrates a strong demand for information about the event after its conclusion. Members of the public routinely expressed frustration at the lack of information about the benefits and impacts of how the event was managed, including how much water was taken during the event.⁴³

The [Targets and Principles Fact Sheet](#) was published in May 2020. On 14 May 2020, a DPIE Water webpage was also created which outlines preliminary information about the benefits from temporary water restrictions, and includes an outline of rainfall and flows, the replenishment of town water supplies and groundwater resources, and impacts on water quality, fish and wetlands and riparian habitats arising from the event. Information regarding the distribution of flows (water balance) information was published in early July 2020.⁴⁴

7. Findings in relation to management of the event

7.1 Preliminary

First and foremost, the Panel recognises that it is easy to judge the actions of another with the benefit of perfect information that was not available at the time. However, the actions and decisions of the officers involved in managing the 2020 Northern Basin First Flush event have to be judged by reference to the information that was available to them at the time they were being made.

As a whole, the Panel is of a view that agency officers had reasonable internal decision-making processes in place to do a relatively good job meeting the objectives of satisfying critical human water needs and critical environmental water needs across the whole of the Northern Basin in NSW, based on the information and resources they had at the time. They also demonstrated great focus, courage, tenacity and determination in their efforts to manage what was a very dynamic, complex and imperfect situation.

Communities and Traditional Owners were generally delighted to see water return to their rivers. The use of discretionary section 324 temporary water restrictions demonstrated commitment by the NSW Government to protect and restore water for the environment, and those efforts have been recognised and praised by the Commonwealth Department of Agriculture, Water and the Environment, the CEWO, the MDBA and some members of the Lower Darling communities.⁴⁵

⁴² See for example NSW Irrigators Council written submission dated June 2020.

⁴³ This frustration was particularly apparent in survey responses. See also written submission from Menindee Lakes stakeholder group dated 30 May 2020 and written submission of Howard Jones, Barrie MacMillan and Dr John Cooke dated June 2020. The need for follow up information and reporting was also acknowledged by the written submission of the Murray Darling Basin Authority and the Commonwealth Environmental Holder's Office dated June 2020.

⁴⁴ <https://www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/managing-drought-recovery/north-west-flows-in-early-2020>

⁴⁵ Written submission of the Murray Darling Basin Authority, Commonwealth Environmental Water Office, Robert and Katharine McBride dated June 2020 and survey responses.

Nevertheless, a significant majority of survey responses and written submissions to the Panel indicated that many water users, affected communities and others believe that the NSW agencies did a very bad job in managing the event, with extremely poor communications, largely unknown objectives, missed opportunities and substantial biases towards or away from certain water users and uses, including the environment. Levels of anxiety and mistrust expressed were palpable as a result.

At the time the 2020 Northern Basin First Flush event began, not only were environmental systems under stress due to the drought, but individuals and communities from the north to the south were also under severe financial, emotional and physical distress.⁴⁶ Staff working in agencies faced the same pressures, and the extremely challenging task of balancing competing, truly critical needs and wants. All findings and recommendations of this draft report firmly acknowledge this difficult situation.

It's also important to note that the 2020 Northern Basin First Flush event was not a single event. It was the product of several rainfall and flow events in many locations in a large and complex basin. This further confounded the need for updated information and management responses as the flows unfolded. The drought leading into the first flush event was extreme and unprecedented, and arguably the precise type of extreme event that section 324 orders were designed to manage. However, the flows themselves were not necessarily extreme and unprecedented in all areas, and over time.

Management of the event was substantially complicated by the simultaneous introduction of the floodplain harvesting regulation. While introduction per se of this exemption won't be an issue in the future, floodplain harvesting remains a complex and controversial matter. The unfortunate timing was compounded by the long gestation period for implementing the floodplain harvesting policy. The lack of communications around the regulation substantially inflamed the issue.

However, the 2020 Northern Basin First Flush event also produced some wonderful and much needed outcomes for communities in need. According to DPIE Water's website,⁴⁷ water supplies were secured for Goondiwindi, Boggabilla, Mungindi, Collarenebri, Walgett, Brewarrina, Bourke, Wilcannia, Menindee, Sunset Strip and Pooncarie. Menindee Lakes received enough water to enable a pulse release which re-started the river without fish kills or blue-green algae outbreaks, a strategy welcomed by the Lower Darling community and acknowledged by the MDBA.⁴⁸

Thousands of kilometres of rivers flowed for the first time in many months and catchments in the Northern Basin have shown improvements in water quality. Salinity levels along the Barwon-Darling have improved. The flows disrupted stratification and dispersed a number of algal blooms that were present in the system. During the drought, water mixers were placed in ten large weir and refuge pools in the river at Menindee and in the Lower Darling River. These mixers protected some fish so that the population could recover when the river began to flow again. The mixers are no longer required as the water quality has improved because of these flows.

The Barwon-Darling River is again connected with its tributaries. Fish and other aquatic animals can move up and down significant lengths of the rivers. Within the Central Gingham Water Management Area, more than 1700 ha of semi-permanent wetlands (Common Reed, Cumbungi, Water Couch) were inundated. In the Lower Gwydir, more than 1800 ha of semi-permanent wetland were inundated as a result.

⁴⁶ See written submission of Dugald Bucknell, Robert and Katharine McBride and Garry Hall dated June 2020.

⁴⁷ <https://www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/managing-drought-recovery/north-west-flows-in-early-2020>.

⁴⁸ Written submission of the Lower Darling Horticulture Group and Murray Darling Basin Authority both dated June 2020. See also Commonwealth Environmental Water Office submission dated June 2020.

Unfortunately, these positive outcomes have been overshadowed by significant levels of frustration and stress across communities, and there remains an overriding perception that the event was very poorly managed, leading to lost opportunities that cannot be regained, from both economic and environmental perspectives alike.⁴⁹

7.2 Adequacy of planning for the event

The Panel's assessment concludes that some, but ultimately insufficient planning and preparation was undertaken for the 2020 Northern Basin First Flush event by the NSW Government. Most significantly, in regard to not informing water users and the community of the evidence being used to prepare targets and principles, giving them an opportunity to provide feedback on that approach, and not developing adequate incident management arrangements. To be clear, the Panel does not consider it appropriate to 'negotiate' science based, peer reviewed targets. However, the prior disclosure and discussion of work being carried out to develop a framework for managing the first flush would have helped water users and the community better prepare for the first flush event.

Clear criteria, principles, and targets to manage the event were prepared internally, and this was well understood by agency staff who were directly involved in managing the event. However, while internal cross-agency technical and decision advisory groups and processes were established, there was no real incident management preparedness. Interviews revealed that DPIE Water had not appreciated the extent to which this would be required, and that is partially understandable given this was the first time the NSW Government had attempted to actively manage a natural event of this magnitude. Nevertheless, cumulative rainfall events are not unprecedented following record droughts.

Further, the work which established the decision-making framework was finalised relatively late (only days before the event unfolded) and arguably, it would have been known for some time throughout 2019 that at some point, a first flush event would occur.

2019 was a particularly difficult year given the need to manage the extreme drought, bushfires, and preparation of water resource plans across the State. In addition to this, DPIE Water was also subject to a Ministerial and Departmental leadership change following another government restructure which commenced on 1 July 2019, and the Government had to respond to a number of independent assessments such as the Vertessy Report and the NRC Review while still in the processing of implementing reforms arising from the Matthews Inquiry.

However, in connection with drought management, more prior planning was required to consider a range of incident scenarios, corresponding management responses and to prepare the community for how water would be managed when rainfalls finally returned. The 2020 Northern Basin First Flush event grew over time, and the NSW Government needed to adequately plan and communicate for this scenario. However, it is apparent that it did not have sufficient resourcing in place to do so.

Floodplain harvesting, and how this would be incorporated into the management framework, was not substantially taken into account. The severe weather warnings, including warnings of heavy rainfall that may lead to local flash flooding in the Northern Basin catchments, were issued by the BoM and SES *after* the floodplain harvesting exemption regulation and the floodplain harvesting restriction were gazetted. Such severe weather warnings were issued for various locations on the evening of Friday 7 February 2020, the afternoon and evening of Saturday 8 February 2020, the late afternoon and evening of Sunday 9 February and the evening of Monday 10 February 2020. While there were no relevant severe weather warnings anticipating flash flooding in the week or so leading up to the gazettals, it would still have been

⁴⁹ Written submissions from Mike Carberry, Josh & Mel Hatton, Nicole McGinnity, Josh Schwager, Andrew Watson, Susan Wright and Andrew Carberry, Alan & Kym Redfern, Healthy Rivers Dubbo, Dugald Bucknell, Garry Hall, Sarah Moles and the Nature Conservation Council, and comments in survey responses.

prudent to undertake some preparatory scenario/risk management planning for a situation where overland flow or overbank flooding occurred during or immediately after the first flush. This would have also enhanced the capacity for NRAR to deploy staff to monitor compliance in relation to the event.

There was also a lack of general information in the public domain about who, when and how it is decided that a section 324 restriction should be imposed, including understanding of the associated public interest test. In January 2019, DPIE Water committed to develop guidance materials on temporary water restrictions, the factors the Minister could consider and how to inform the public - all of which would have supported greater transparency around the rationale, benefits and impacts of temporary water restrictions in advance of an event. Unfortunately, such materials were not and have not been prepared.

The Panel understands that northern valley irrigators had written to DPIE Water on several occasions regarding the process and improvement they perceive is needed in quantifying the public interest test as recently as January 2020, evidencing the need for a more engaged and transparent process.⁵⁰

Proper incident management requires the functions of planning, intelligence, public information, operations, investigation, logistics and finance to be put in place. Under the Australasian Inter-Service Incident Management System, the function of public information will require the same priority and level of focus as operations for any incident that may impact on community safety.⁵¹ In this case, not all incident management functions were clearly or adequately put in place. While WaterNSW has some incident management capabilities associated with flood incidents, those systems were not explicitly applied to the 2020 Northern Basin First Flush event.

Ultimately this lack of incident management preparedness led to major challenges and shortfalls which impacted the staff involved, as well as the communities they were using their best efforts to serve.

7.3 The objectives, targets and principles

Internally, the interim targets and principles used to manage the event provided the decision-makers and their advisors a clear, consistent and structured approach to decision making. While the principles were sometimes expressed slightly differently in various documents throughout the event, the general approach was consistent, and targets were consistently applied. The workflow was also reasonably robust and well documented, despite being done in a short amount of time. This was the product of a significant effort by the staff involved and despite the lack of systems to support documentation in incident management scenarios.

In the Panel's view, the interim targets and principles themselves formed a reasonably sound basis for event management. However, while some elements were quantified, not all were. Volumes for critical human water needs and basic landholder rights were not clearly documented. Instead, these were subject to a broad assumption that basic landholder rights would be met if critical environmental watering needs were met. Evidence for this may exist but it is not obvious. Inadequate consideration was given to Native Title rights generally, as evidenced by their exclusion from the objectives in managing the event.

Neither the volumes nor a description of the target in relation to refilling of storage dams and weir pools were clearly expressed in the targets or principles and the appropriateness of using ten days duration of low flows (freshes) to develop volumetric targets requires further analysis. Further, some aspects of decision making were not altogether clear - such as just how far

⁵⁰ Written submissions from Josh & Mel Hatton, Nicole McGinnity, Josh Schwager, Andrew Watson, Susan Wright and Andrew Carberry

⁵¹ *The Australasian Inter-Service Incident Management System*, Australian Fire and Emergency Service Authorities Council 2017. AFAC Ltd

downstream was to be considered in relation to each decision. This may have been changing according to forecasting, but these matters were not expressed clearly in the decision-making framework. The principles also did not clearly deal with how high priority use downstream was balanced against lower priority uses upstream. Particular concerns were raised in one written submission regarding the decision to lift restrictions on C Class Licences in the Barwon-Darling prior to an allocation being made to high or general security Licences in Menindee or Lower Darling.⁵² A number of submissions also suggested that end of system targets should be increased and that upstream access should not be provided until downstream requirements were met (rather than simply being forecast to be met).⁵³ Such suggestions indicate there is a need for increased information and understanding of water management in a large connected river basin and the implications of various different approaches.

DPIE Water has noted that the targets will be reviewed prior to being utilised in the future, and the extent to which the targets were met, the appropriateness of the targets, and the outcomes of the restrictions are being further evaluated.

While internally, the decision-making framework met statutory requirements, this was not helpful to water users, and less helpful to the general public in understanding how the event was being managed. The process was opaque. Even though the hesitation in releasing the principles and flow targets to stakeholders is somewhat understandable (particularly given they were finalised only days before the event unfolded), the effect was that the community was not adequately prepared for the event. Community levels of trust in NSW water management have been low and in need of rebuilding since the July 2017 Four Corners program “Pumped”, which raised significant public concern about the effectiveness of current NSW compliance and enforcement arrangements for water. Not releasing this information was a significant shortfall in transparency which does not assist in rebuilding that trust. It does not live up to the Government’s commitments in response to the Matthews Inquiry in relation to making information available. In his Interim Report, Ken Matthews noted the importance of clearly communicating the methodology for adjustments to stream gauging data as soon as possible for the sake of public confidence and sound legal process. In the Panel’s view, the same principle applied to the proposed framework for first flush management.

Although the objectives of restrictions were published on the DPIE Water website, they were only published in the individual reasons for decisions for each restriction, and were not readily accessible to a member of the community who might have been looking for that information. While the published reasons for decision do provide insight into the matters decision-makers have taken into account for a particular circumstance, they did not cater to enhancing the broader community’s understanding of how water was being managed. The dissemination of information through a scattered variety of gazettals, fact sheets, operational updates, notifications and media articles reflects the unexpected complexity of the first flush event. But it also made it very difficult for the public to have confidence in the integrity of the decisions being made, and even those with good knowledge of water issues and rules had difficulty following the decisions made during the event.⁵⁴

Frustration at the lack of transparency was compounded by the fact that the only target which was publicly released during the event (the target volume for the Menindee Lakes), was also one of the only two targets that changed throughout the event (the other target relating to the Macquarie Marshes). While the adjustment of the targets may have reflected a logical commitment to adaptive management practices and reliance on best available information, it is

⁵² See written submission of Howard Jones, Barrie MacMillan and Dr John Cooke dated June 2020.

⁵³ Written submissions of Lower Darling Horticulture Group dated June 2020, Healthy Rivers Dubbo dated 4 June 2020 and Sarah Moles dated 7 June 2020, Rob and Katharine McBride dated 7 June 2020 and survey comments.

⁵⁴ See written submission of Nature Conservation Council dated 9 June 2020 and Bourke Shire Council dated June 2020.

understandable that, publicly, this was treated with suspicion and regarded as a changing of the goal posts.

Externally, the lack of clarity also led to an inability for water users to plan their operations, compounding already high levels of stress and anxiety following the prolonged drought. It also denied indigenous communities the opportunity to celebrate the positive cultural outcomes that were being generated by flows through the river system as the event and its management unfolded.

Further, the lack of communication and access to information made it seem to stakeholders that, overall, the decision makers did not seem to put themselves in stakeholders' shoes to understand how they would be impacted. This was noticeably the case for restrictions around floodplain harvesting. The Panel does not believe this to be necessarily true, but instead that the sentiment reflects the polarised views and competing demands for a limited resource, and insufficient resources being dedicated to facilitating better communication and engagement before, during and after the first flush event. While floodplain harvesters may well have been unhappy about the harvesting restriction even if they had known about it in advance, not knowing about it in advance compounded their disgruntlement.

7.4 Roles and responsibilities in decision making

Internally, there was a strong clarity of roles and responsibilities in managing this event that should be commended. When asked what worked well, every agency directly involved in managing the event commented on how well and collaboratively agency staff worked with each other. The event was managed by a cohesive and resilient working group who had clarity of roles and responsibilities and showed great dedication and commitment, and mutual support in their attempt to manage the event under sometimes very stressful conditions. Over time, officers developed rosters to help cope with the near 24/7 demands of managing the event. Unfortunately, this hard work and dedication was overshadowed by the lack of a clear point of contact for external communication with stakeholders. The community was not clear on who was doing what, which led to communication and confidence issues and frustrations which generate a lack of trust. Some decisions lacked access to local knowledge, and this was of strong concern to communities.

Information gaps were compounded by the exclusion of DPIE-EES from routine decision-making processes. Specifically, decisions were being made with the objective to meet critical environmental needs, but advice from environmental experts was not being routinely sought or provided, except by DPI Fisheries to the extent that the critical environmental needs related to fish impacts.

Advice was sought from DPIE-EES in relation to supplementary announcements that affected specific environment sites, such as the Macquarie Marshes and the Gwydir Wetlands. But there was no other involvement in decision-making during the event, apparently due to perceived conflict of interest issues. These should be dealt with in advance. DPIE Water has recognised that in hindsight, it would have been preferable to routinely include advice from DPIE-EES as part of the decision-making process, in relation to their policy/operational functions (and not their role as a licence holder).

7.5 Evidence relied upon in decision-making

In the Panel's view, the forecasting approach used to manage the event was generally robust, enabling decisions to be made on the best available evidence at each time. The Panel agrees with the MDBA's view that NSW made substantial efforts to use the best available information to

make decisions.⁵⁵ The Panel also endorses the use of a conservative approach to forecast flows in first flush events.

However, there remain some major data gaps to be resolved, including flows out of Queensland, floodplain harvesting and flow data (particularly overbank flows), and allowances for amounts of water to move to downstream locations. There are lessons to be learned from each event and better and more predictable coordination with Queensland will be essential.

Information on how antecedent conditions are taken into account is another area requiring consideration.

There was also a lack of local knowledge in decision-making. The dynamic nature of the event, coupled with inadequate incident management preparedness, meant that local scale insights, needs, demands and impacts did not factor into decision making as they ideally would.

7.6 Communications after the event

There remains a strong unmet demand for information about the event from the community. Resources were not put aside to meet this demand. This has been a significant source of frustration across the community, from extractive users to environmental groups alike.⁵⁶ The limited information that has been published has allowed speculation about extraction, impacts and outcomes of the event to become de facto truths, and promote perceptions of mistrust, secrecy and mismanagement. It has inhibited a productive fact based discussion on the benefits and costs of first flush events.

8. How management of the event satisfied NSW Government responses to prior independent investigations into NSW water management

8.1 The Matthews Inquiry

Ken Matthews AO was commissioned to conduct an Independent Investigation into NSW Water Management and Compliance following the broadcast of a Four Corners program *"Pumped: who is benefiting from the billions spent on the Murray-Darling?"* on 24 July 2017. The program presented allegations of widespread non-compliance with NSW water law, particularly in the Barwon-Darling River system in Northern NSW and prompted significant public concern about the effectiveness of current NSW compliance and enforcement arrangements for water.

In his interim and final reports, Matthews found that water-related compliance and enforcement arrangements required significant and urgent improvement.

In his Interim Report, he found that

1. The overall standard of NSW compliance and enforcement work had been poor.
2. Arrangements for metering, monitoring and measurement of water extractions, especially in the Barwon–Darling river system, were not at the standard required for sound water management and expected by the community.
3. Certain individual cases of alleged non-compliance had remained unresolved for far too long.

⁵⁵ Written submission of the Murray Darling Basin Authority dated June 2020.

⁵⁶ Healthy Rivers Dubbo submission dated 4 June 2020, Howard Jones, Barrie MacMillan and Dr John Cooke dated June 2020 and comments in survey responses. This has also been strongly expressed by members of the Water User Reference Group.

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4. There was little transparency to members of the public of water regulation arrangements in NSW, including the compliance and enforcement arrangements which should underpin public confidence.

The Interim Report recommended a far-reaching reform package which included creation of the new and independent NSW Natural Resources Access Regulator to assume responsibility for compliance and enforcement responsibilities, and complementary administrative and operational reforms to support a more transparent, independent and effective enforcement system.

The NSW Government adopted the recommendations from the Interim Report, and the Final Report assessed the Department's implementation progress to date and offered advice on how to tackle the work involved in the months ahead. The key risks identified to continued momentum included:

- risks associated with planning the implementation of the reforms,
- risks in not allocating the necessary financial and staff resources to the tasks,
- the challenges in translating the government's desired high-level reform outcomes into specific and practical measures on the ground,
- increasing pressure from certain stakeholders to 'water down' key reforms, including reforms to water metering and improving transparency of information about water usage, and
- the risk of uncooperative relationships between government agencies and the risks associated with a new round of restructuring of staff involved in compliance and enforcement.

In December 2017, the NSW Water Reform Action Plan was released outlining the following NSW water goals, with key initiatives to be achieved by specific dates.

- **Introduce best practice for water management**

Most relevant to this assessment, key initiatives included defining and explaining the specific roles of government bodies that have accountability for water management.

- **Build a compliance and enforcement regime that ensures strong and certain regulation**

Most relevant to this review, key initiatives involved strengthening compliance and enforcement capacity, implementing a robust metering framework and adopting innovative technologies to improve compliance effectiveness.

- **Ensure transparency in how we share, allocate and manage water**

Key initiatives included increasing transparency in water management, creating a stakeholder engagement framework, and improving the management of environmental water.

- **Build capability to support implementation of water reforms**

Key initiatives aimed at building capability, improving standards and embedding an ethical culture.

8.2 Extent to which management of the event was consistent with the Government's response to the Matthews Inquiry

Introduce best practice management for water

The final Matthews report highlighted the critical importance of clarity between the respective roles of NRAR, WaterNSW and the now DPIE Water, and the need to delineate roles to avoid any overlap in responsibilities, causing unnecessary costs as well as confusion in the minds of clients and staff. It also emphasised the need for constructive and collaborative relationships between the agencies to lift overall performance.

Internally, in the management of the 2020 Northern Basin First Flush event, there was strong clarity about the different roles of each agency. Further, there was a commendable effort of staff to work cooperatively and collaboratively which is needed from the NSW Government in managing this event. The only blurring of boundaries between the agencies came in the area of communications - but this was due to a collective effort to address the systemic gaps, rather than any ambiguity in roles and responsibilities. The Panel hopes the positive tone of the relationships modelled by senior officers in managing the event continues to lift ongoing performance.

However, this internal clarity did not translate to clarity for water users and communities. While peak industry groups making direct representations to DPIE Water and WaterNSW officers during the event understood the delineation of roles, other stakeholders and community members (particularly indigenous communities) did not have a good understanding of who was doing what or where a point of contact could be found.

Build a compliance and enforcement regime that ensures strong and certain regulation

NRAR compliance investigations related to the temporary water restrictions are ongoing. Earlier advice to NRAR would have enabled them to consider more in field compliance activity. As well, this event reinforced the need for reforms which are not yet fully implemented. This applies particularly to implementation of the Floodplain Harvesting Policy as is evidenced by the speculation about the initial regulation, the lifting of restrictions on take and how much water was taken. Both management of the event, as well as compliance and enforcement activities, would have benefited from the pending metering and telemetry reforms (being implemented in stages from 1 December 2020). The use of LiDAR remote sensing technology to measure on-farm water storages is also an important development, but further progress is required.

Ensure transparency in how we share, allocate and manage water

The Matthews Inquiry identified that water is a community-owned resource and members of the public have the right to satisfy themselves that it is being used in compliance with the law. While a great deal of information was published throughout the event (as outlined in the table at Appendix I), genuine transparency was not achieved before, during or after the 2020 Northern Basin First Flush event due to:

- the sporadic and varied nature of the information (published on different platforms, catered to different audiences, seemingly for different purposes, according to no clear timetable and not always easy to find even if the finder knows what they are seeking),
- the lack of public communication for water users or the public about objectives, rationale, and how the first flush would be managed prior to the event,
- the lack of transparency of the targets, principles and processes for managing the event,

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- the lack of any public communication regarding the proposed introduction of the floodplain harvesting regulation and the floodplain harvesting restriction,,
 - the feedback that communications were not accessible, timely or clear, and
 - the absence of a contact point for enquiries.

The final Matthews report commented on the need for consultation regarding reforms to be broad-based, with no single group having a monopoly on access. In preparing for this event, in particular the proposal to proactively impose a temporary water restriction, there was not broad-based consultation, even if there was relatively comprehensive consultation with relevant government agencies. During the event, there was no clear framework to ensure equitable access for the full range of stakeholders or a transparent set of engagement arrangements in place. This will be essential to improving first flush management in the future.

The Panel considers that ultimately these shortfalls were not due to a lack of will on the part of agencies, but rather a broader lack of resources to adequately and strategically and operationally plan and prepare for the return of flows in rivers following sufficient rainfall. Ultimately, first flush management in this event was about the one-off application of temporary water restrictions under section 324 of the WM Act. It was a part of the regulatory framework which needs further development. And if this was not apparent prior to the 2020 Northern Basin First Flush event, it is now.

The Matthews Inquiry highlighted the need for reforms to be adequately resourced and noted the damaging effect of government restructures, and the Panel's assessment is consistent with those findings and concerns.

Finally, the Matthews final report also highlighted the need for greater protection of environmental water. The Panel considers that management of the 2020 Northern Basin First Flush event demonstrated a very strong commitment to ensuring that protection.

8.3 The Vertessy assessment and report

The *Independent Assessment of the 2018-19 Fish Deaths in the lower Darling*, was undertaken by an Independent Panel appointed by the Hon David Littleproud MP, Minister for Agriculture and Water Resources, following three significant fish death events in the Darling River near Menindee between December 2018 and January 2019. Among other matters, the assessment found that:

- the fish death events in the Lower Darling were preceded and affected by exceptional climatic conditions, unparalleled in the observed climate record, and
- water extractions from the tributaries of the Barwon–Darling have a much greater impact on Menindee inflows than extractions directly from the Barwon–Darling River, but when flows are low, the capacity for A class extractions from the Barwon-Darling is a serious threat to the connectivity of the river between Bourke and Menindee.

The Independent Panel recommendations included that:

- Water access arrangements under the Barwon–Darling Water Sharing Plan should be modified to protect low flows.
- QLD and NSW should ensure that they give greater attention to the need to maintain hydrologic connectivity in the Barwon–Darling River.
- NSW and QLD should adopt an active event-based management approach to providing flows through the Barwon–Darling system. Flow management strategies should be implemented as soon as possible to protect first flushes, protect low flows, shepherd environmental releases, enhance system connectivity, and improve water quality.

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- NSW should review and refine the flow requirements to control stratification in weir pools deemed to be at high risk of fish deaths.
 - Within one year, NSW and QLD should establish an agreed protocol to protect first flushes
 - Within two years, NSW and QLD should introduce more accurate continuous and real-time monitoring of diversions in the Barwon–Darling, to ensure protection of managed connectivity events. Compliance around all metering requirements and overland flow extractions should be strengthened expeditiously.
 - Within two years, NSW and QLD should improve the reliability and transparency of the assessment of the hydrologic impacts of floodplain harvesting.
 - Within three years, NSW and QLD should improve monitoring of end-of-system tributary flows that contribute to hydrologic connectivity in the Darling system, and make that data readily available.

As set out in section 4.2 of this draft Report, these recommendations largely have been, or are in the process of being, implemented by DPIE Water. The fact that implementation of some of these recommendations has not yet been completed certainly impacted on management of the event and emphasises the need for implementation effort to continue.

8.4 The NRC Review

As outlined in section 4.6 of the draft report, the Natural Resources Commission's statutory review of the Barwon-Darling water sharing plan (published September 2019) was brought forward at the request of the then Minister for Regional Water (with the support of the Premier), having regard to the high public interest in the operation of the plan and downstream fish deaths.

The NRC reviewed the extent to which the water sharing provisions materially contributed to the achievement of, or the failure to achieve, environmental, social and economic outcomes, and found that the current plan did not effectively prioritise protection of the water source and dependent ecosystems, followed by basic landholder rights including native title, and then other extractive uses.

The NRC Review recognised the reforms undertaken since 2017 regarding improved metering, transparency, compliance and enforcement, and management of environmental water (including the use of section 324 orders to ensure that water held and released for the environment was not available for extraction, and the creation of NRAR).

However, it identified the need for further action to address the extraction of water during critical low flow periods (by raising the cease to pump level) and the removal of the 'imminent flow' allowance. The NRC also recommended:

- protection of flows under new provisions to enable implementation of an updated Interim Unregulated Flow Management Plan for the North- West (the Interim Flow Plan). It also recommended the acknowledgement of native title rights to water in the plan, and
- provision of interim allocations for Aboriginal nations and organisations and taking steps to improve management of connectivity across the Northern Basin, including review of upstream water sharing plans for their connectivity to the Barwon-Darling and contribution to improved outcomes.

8.5 The Government's response to the Vertessy report and NRC Review

In response to the Vertessy report and the NRC Review, the NSW Government announced it would adopt a staged approach to address those recommendations, and continue to use the best available information and work with stakeholders to make positive changes to water management rules that ensure the best outcomes for regional communities, the environment and industries.

The first stage was to implement actions to better manage environmental water and the health of fish populations, including to implement rule changes in response to the NRC's recommendations to protect low flows, immediately protect water for towns and the environment and implement commitments to better manage environmental water. This included introducing new rules to the Barwon-Darling water sharing plan (which came into effect on 1 July 2020) which manage the resumption of flows in the river following extended dry periods, implementing individual daily extraction limits (IDELs) for licence holders, and preventing the extraction of environmental water so it can remain in the river and achieve the desired environmental and social outcomes.

The second stage includes exploring options for an Aboriginal water policy with the aim of improving the representation of Aboriginal cultural interests and values in water management.

The third stage involves implementing an effective monitoring, evaluation and reporting framework to understand how far changes in Stage 1 and 2 go towards improving environmental, social and cultural outcomes in the Barwon–Darling. Stage 3 work was contemplated as providing a better understanding of connectivity between the rivers and valleys in the northern NSW Basin, acknowledging that many of the Vertessy and NRC recommendations go towards looking at water as a whole system, rather than as individual valleys. It identified working with Queensland as a key focus, given the significant impact that water management in Queensland has on water flowing into NSW.

8.6 Extent to which management of the event was consistent with the Government's response to the Vertessy report and NRC review

Management of the 2020 Northern Basin First Flush event successfully took immediate action to protect water for towns and the environment. Two years of water supply was secured for 11 communities across the Northern Basin, Menindee Lakes received 12-18 months' water supply and sufficient water was protected to restart the Lower Darling River without fish kills, a salinity problem or blue-green algae outbreaks.

By the end of April, more than 2600 ha of the critical Northern Reedbed of the Macquarie Marshes was inundated. In relation to the Gwydir Wetlands, in the Central Gingham Water Management Area, more than 1700 ha of semi-permanent wetlands (Common Reed, Cumbungi, Water Couch) were inundated. In the Lower Gwydir, more than 1800 ha of semi-permanent wetland was inundated.

The flows reconnected the Barwon-Darling River with its tributaries and enabled fish and other aquatic animals to move up and down significant lengths of the rivers. Preliminary results indicate that Golden Perch had numerous breeding events because of these flows.⁵⁷

⁵⁷ DPIE Water Drought update "North-west flows in early 2020 - benefits from temporary water restrictions" information at <https://www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/managing-drought-recovery/north-west-flows-in-early-2020>

The improved environmental outcomes and return of flows to the river brought hope to communities. However, the capacity to maximise these social outcomes was compromised by the lack of communications about the event. With more notice, indigenous communities in the Gomeri, Ngemba and Barkandji regions could have organised celebrations of the return of flows in the river and optimised the exercise of cultural rights.

There was an overall failure to engage with indigenous communities in managing this event which represented a lost opportunity to remind communities of the social and cultural benefits of protecting first flushes.

While the Northern Basin Environmental Working Group enabled some communication between NSW and Queensland in managing the first flows, there was no coordinated approach. This has led to feelings of frustration and inequity for Northern Basin communities, as northern NSW irrigators feel they missed their opportunity to take water as a result.

The Panel finally notes that implementation of commitments and programs regarding metering, rule changes and increased monitoring, evaluation and reporting to better understand connectivity and improvements to environmental, social, cultural and economic outcomes are also essential to improve the future management of first flush events.

9. Appropriateness of the use of section 324 orders to manage first flush events

While the 'public interest' threshold for imposing a temporary water restriction is broad enough to enable temporary water restrictions to be used to limit access to flows which will protect water sources, it's worth noting that, in the vast majority of cases, section 324 orders are used to cope with the decreasing availability of water, not the increasing availability of water. Even in the Extreme Events Policy and incident response guides, section 324 orders are referred to as a tool to manage water sources as they go into drought, rather than as they come out of drought. The WM Act in and of itself does not provide the complete framework for section 324 orders to be applied and lifted dynamically, as is required to manage first flush events.

Given the way the event unfolded, and given how first flush events often evolve (being in the form of cumulative rainfall events that cannot be predicted very far in advance), the use of more flexible provisions which incorporated the ability to grant 'approvals to take' was a good decision. It would have been very difficult to manage the event as adaptively as was done, if broadcast and individual gazettals were required to enable water users to take water. Delays would have caused particular prejudice to unregulated water users in systems which rise and fall quickly, and whose opportunity to take only lasts as long as the river remains at a certain level.

However, not having the ability to effectively actively manage flows embedded in the legislative framework or any government policy means it is difficult to ensure a consistent application of decision-making frameworks, and the process is not transparent or necessarily subjected to a rigorous public process before being relied upon.

Further, the general reliance on section 324 orders relies on the courage of the decision-makers of the day to make conscious decisions to protect the first flows after extended dry periods and the burden of making the 'right' decisions falls solely on their shoulders. This is not an ideal situation for the community, water users or agencies.

The Panel notes that, as of 1 July 2020, a 'resumption of flow rule', has been inserted by way of clause 50 of the *Water Sharing Plan for the Barwon-Darling Unregulated River Water Sources 2012*. This rule prevents the take of water after an extended dry period. The incorporation of this

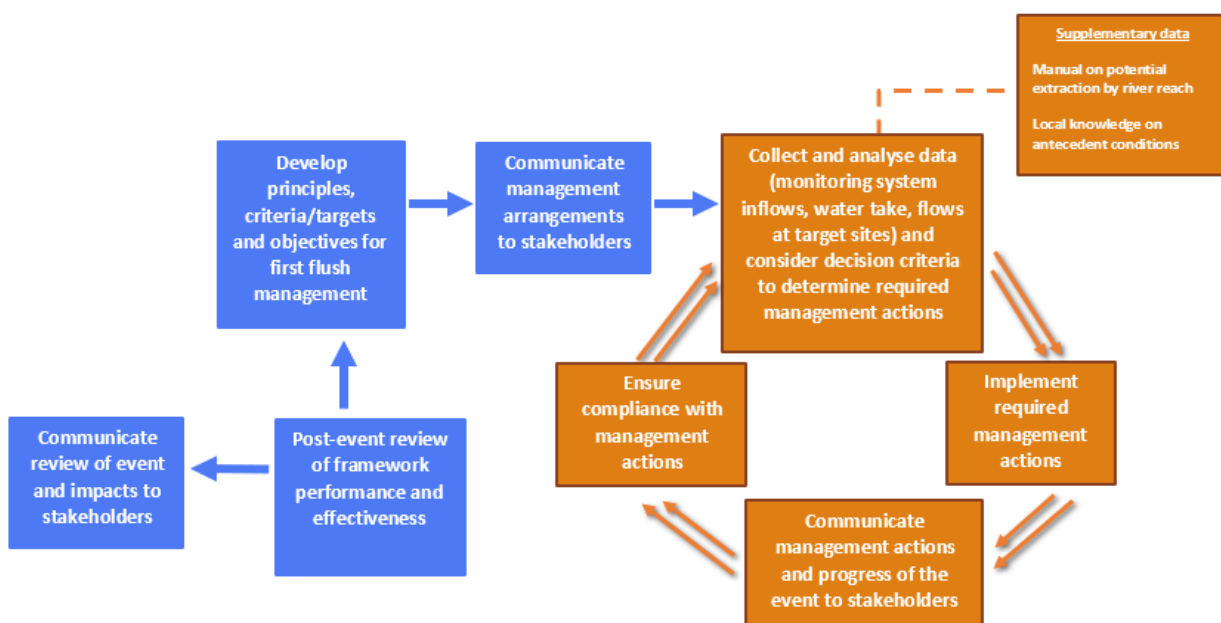
rule will obviate the need for a section 324 order to be used to manage some first flows, but the Panel is of the view that this rule alone will not be sufficient to manage all first flush events.

All sectors of the community who undertook the survey, made submissions or were represented on the Water Users Reference group for this assessment have supported the inclusion of rules to manage first flush events in water sharing plans. The Panel agrees with this proposal, in principle. But in practice, full incorporation of first flush management, including detailed rules and specific targets, into all required water sharing plans will take years. In addition, the evidence base is currently insufficient and there is insufficient experience in the process to have confidence that all targets which would need to be set in water sharing plans at essentially short notice will adequately achieve the outcomes required to most effectively meet the competing needs across the Basin in times of drought.

A key element to determine the requirements to meet critical needs after an extended dry period is understanding the amount of water required to refill pools and wet up sections of river channels. However, this varies greatly based on antecedent conditions. For example, three times as much water was required to refill pools and wet up sections of river channel between Collarenebri and Brewarrina during the Northern Fish Flow as compared to the Northern Connectivity Event, simply because conditions prior to the Northern Fish Flow were much drier than for the Northern Connectivity Event. The current understanding of these matters is limited.

On this basis, the Panel considers that, in the first instance, a similar decision-making approach taken to managing the 2020 Northern Basin First Flush event (with greater rigour, and informed through consultation with communities) should be embedded in the WM Act, Extreme Events Policy, Water Sharing Plans and Incident Response Guides, to reduce the current reliance on event based section 324 orders, and improve transparency and predictability for communities and water users. Over time and with experience, more rules can be incorporated into water sharing plans.

Irrespective of the regulatory framework adopted to manage first flush events, the Panel considers that the 2020 Northern Basin First Flush event provided enough experience to indicate the system that would lead to improved first flush management. That system relies on undertaking thorough planning and preparation before a first flush event, clear communication of management arrangements to water users and communities, and processes in place to ensure the best available evidence is available to decision makers when an event is unfolding. A diagram of the suggested system is set out below. Blue boxes indicate steps to be undertaken outside of the event. Orange boxes indicate steps to be undertaken during an event.



The suggested changes to first flush management are reflected in the recommendations set out in Chapter 10 of this draft report, including an example of the types of matters that could be incorporated into the WM Act, Extreme Events Policy, water sharing plans and incident response guides. However, any framework adopted should be developed in consultation with communities, indigenous peoples and water users.

10. Recommendations

Prior to the 2020 Northern Basin First Flush event, real-time management of uncontrolled flows to provide for critical needs throughout the Basin, was a new approach to managing water for the NSW Government. Further, the event took place at a time when a number of key reforms, which are essential to enabling effective real time management, are still being implemented.

Some areas identified for improvement by the Panel are a result of limitations in current datasets, tools and systems for such real-time management. These are known deficiencies in current water management capabilities and a number of them are the subject of programs already in development, or in the process of being implemented. Some of these will not yield the benefits they seek to achieve, for some time.

Other areas for improvement are the result of inexperience in managing events of this nature, and the finite nature of resources to deal with what can often feel like an infinite number of unresolved issues.

The Panel has not prioritised or estimated the costs of the measures set out in its recommendations, which will inevitably have to be considered by the NSW Government. There are benefits and costs in the pursuit of perfect data, perfect information, perfect communication and perfect regulatory frameworks. And the question of who pays the costs, and who receives the benefits, also needs to be considered.

The Panel is mindful that resources are limited, and therefore it would not be practical, realistic or sensible to expect prioritisation of a significant reform program to achieve a gold standard of first flush management in the near future. These are circumstances that, by definition, are not the norm. But in the face of climate change, the occurrence of cease to flow events is increasing. And while the 2020 Northern Basin First Flush event ultimately led to some wonderful outcomes for the environment and communities, the NSW Government must take steps to avoid a repeat of some of the aspects of the 2020 Northern Basin First Flush event in the interests of agency staff, communities and water users. Sufficient resourcing will be required to make these changes.

The following recommendations, including those newly raised as a result of this assessment, seek to optimise and reinforce the importance of work already planned and/or already in the process of being implemented.

They recognise the need to focus the use of limited resources on those efforts that will provide the greatest value in that they will support both first flush and other areas of water reform.

1. Water management must provide for and promote connectivity between water sources.

The WM Act provides that, in relation to water sharing, first priority should be given to protecting the water source and its dependent ecosystems, followed by protection of basic landholder rights, followed by extraction under other rights (section 5 (3) and 9 (1) of the WM Act). The Commonwealth Basin Plan also identifies the protection and restoration of connectivity within and between water-dependent ecosystems as an objective relating to the protection and restoration of the ecosystem functions of water-dependent ecosystems (at section 8.06 (1)).

Connectivity within and between water sources is key if these provisions are to be adhered to and connectivity must be a primary objective of not only first flush management, but river operations generally.

However, as recently noted by the NSW Supreme Court of appeal:

The section 9 duty is one of imperfect obligation, to be exercised in the public interest, for purposes of serving a wide range of broadly expressed policy objectives of a character that overlap, conflict and are incommensurable with each other... in most decisions that apply to a large area, there are apt to be winners and losers... An element of compromise is necessarily involved, e.g. between environmental flows and agricultural users, and this can occur in accordance with and promoting the water management principles.⁵⁸

Further policy work is required to determine how competing needs across the system are balanced, and what measures need to be in place in order to share risks transparently and equitably between water users and between communities along the length of the system, especially in times of drought. Better understanding is required of the extent to which various tributaries contribute to downstream systems, and this needs to be transparent to the community. This work will also need to clarify where the 'end of the system' will be, for the purposes of all cases of first flush management.

2. Any temporary water restrictions required to manage first flush events should be made on a proactive basis.

If conditions require first flows to be protected to meet critical needs (or high priority needs), then temporary water restrictions, adopting active management provisions, should be published proactively (that is, well before rain is forecast). This, coupled with the guidance materials set out in recommendation 3, will provide communities the ability to plan their activities and minimise any potential adverse effects of restrictions. It will also minimise potential work health and safety risks for NRAR officers carrying out compliance activities, in circumstances where there could otherwise be high levels of angst in the community.

3. Until there are further statutory provisions for first flush event management, publish guidance materials which outline how the NSW Government will use temporary water restrictions to manage first flush events.

The current drought is not over. Therefore, it remains very likely that some future inflows will still need to be protected to meet critical needs, before any steps can be taken to incorporate rules into the statutory framework.

The NSW Government should take immediate steps, including consultation with water users and the community, including Traditional Owners, to develop guidance materials which provide increased transparency and confidence around how temporary water restrictions may be used to manage first flush events, including how floodplain harvesting will be managed in first flush events.

Water users and communities should know in advance who will be doing what, what will be expected of them, how they can find out information, and who they should contact with questions. This will give water users and members of the public time to prepare for first flush management and to sign up to relevant platforms to be up-to-date with necessary, accessible and understandable information. Enhanced use of digital platforms and social media should be considered, noting their effectiveness based on survey results.

The guidelines should outline:

⁵⁸ *Randren House Pty Ltd v Water Administration Ministerial Corporation* [2020] NSWCA 14, Leeming JA at [135]-[136], [124] and [139].

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- general information about the use of section 324 orders to manage a first flush event, including:
 - what temporary water restrictions are and what they do,
 - how they may be used to manage first flows,
 - factors a decision-maker could consider in deciding whether to impose or lift a restriction,
 - information about how restrictions will be communicated to the public during an event, including:
 - how the public and/or water users will be informed if and when a water restriction needs to be imposed or lifted,
 - where water users and the public can go to find out information during a first flush event,
 - the person/entity water users and the public can contact if they have questions during an event, and
 - the media spokesperson(s), and
 - how a first flush event will likely be managed, including:
 - who will be responsible for what,
 - the general objectives, principles and targets that will be used to manage the event, and how these were developed (or are still being refined), and
 - an outline of the evidence base that will be used to manage the event (and how this is being refined).
- 4. Incorporate learnings from the 2020 Northern Basin First Flush event into systems that will be used to manage any future first flush event that arise in the short term, including by undertaking community consultation on the objectives, principles and targets.**

Steps should be taken to immediately incorporate the learnings from the 2020 Northern Basin First Flush event into systems that will be relied upon to manage future events.

The Panel understands that WaterNSW has commissioned an independent review of the operational model used in the 2020 Northern Basin First Flush event. Flow forecasting models should be updated with the latest information, including lessons on distribution efficiencies, travel times and the like for all northern rivers (including those in Queensland) from this and other events as identified in that independent review. Better models will improve flow forecasting capacity, which will in turn improve the ability to ensure that targets and objectives of first flush management are met as efficiently as possible.

The objectives, principles and targets used to manage the first flush event should also be re-assessed based on the outcomes they achieved, and expanded to cater for different scenarios, such as cumulative events.

The revised objectives, principles and targets should be further refined with feedback from water users and communities, including Traditional Owners, so that constructive feedback can be considered and incorporated into the framework to be adopted for managing any first flush events in the near future.

Seeking feedback on methodologies and targets is not an opportunity for outcomes to be 'negotiated'. But as reinforced by Ken Matthews in his Final Report, it is critical for concerns to be considered carefully and respectfully, and there must be equitable access to information and the views of different stakeholders.

The consultation approach should enable and encourage access to the full range of those who have interests in water management, and clearly address questions and answers about why certain targets, or approaches are or are not considered appropriate, to enable an informed discussion of these matters.

The framework should be improved to reflect the most up-to-date understanding of what capacity each valley has to meaningfully contribute to downstream targets, including by having regard to channel constraints. Community consultation will, in some cases, be the most efficient means of starting to obtain this information.

DPIE-EES should also be involved in any future management of first flushes. Measures should be taken in these planning stages to resolve any potential or perceived conflict of interest.

5. The evidence base and methodology for first flush management must be quantified, science-based and made publicly available.

As has been largely done to date, the basis for first flush management must be undertaken with a clear methodology, based on the best-available scientific data. Clear hydrological triggers for initiating first flush events should be science-based, consistent with the relevant legal framework and linked to community and environmental objectives. But some policy issues still have to be resolved in order to improve the rigour of any future framework.

Cultural flow requirements must be identified in order to determine what is needed to properly provide for native title rights in a first flush event within basic landholder rights. Reasonable use guidelines must be developed in order to determine what is needed to provide for stock and domestic rights during a first flush event and harvestable rights also need to be quantified. And there must be transparency in the critical environmental water requirements being used to inform targets.

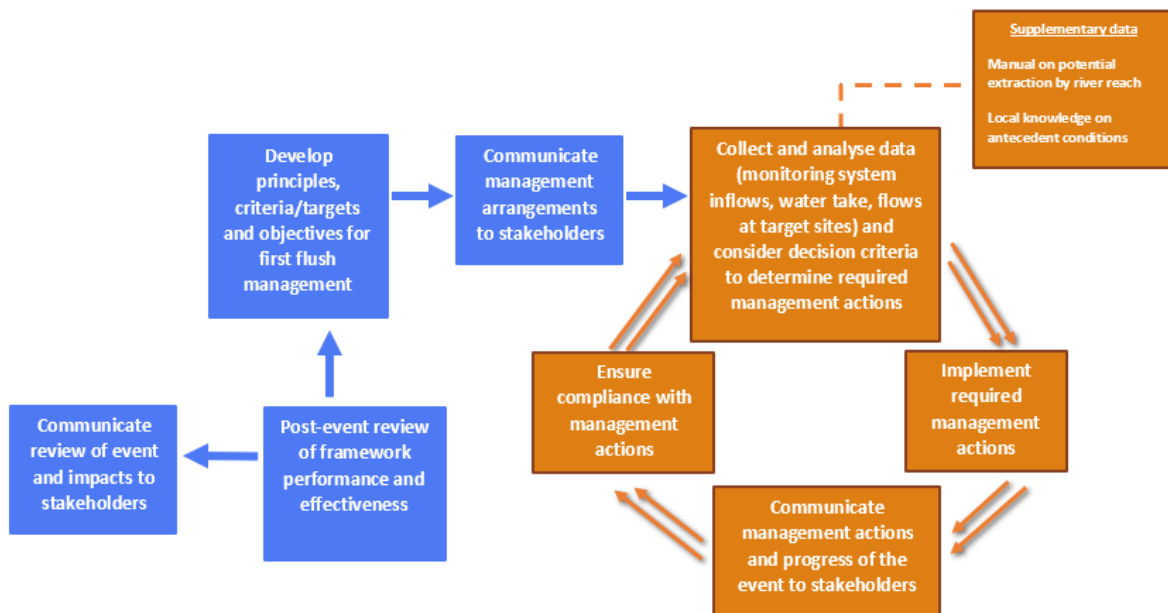
Further, an outline of the evidence base should be published to develop confidence that decisions will be made based on the best available information. Advance publication will also enable that information to be constructively criticised, and properly understood, before it needs to be relied upon. It should explain and document, in simple terms:

- how forecasting is carried out,
- those aspects of forecasting and modelling that rely on imperfect information, and what steps (if any) can be taken to address those imperfections, and
- potential volumes of extraction for each river reach and floodplain.

This information should be updated as legal or environmental factors, best available data or preparedness to manage a first flush change.

6. Review and update incident management systems for managing first flush events.

Incident management systems should be reviewed and updated to address deficiencies highlighted by the 2020 Northern Basin First Flush event, to better deal with any first flush events that arise in the short term. The system should reflect the elements in the following diagram (blue boxes indicating steps to be undertaken outside of the event, and orange boxes indicating steps to be undertaken during an event).



In particular, a communications plan should be developed which, in addition to the information set out in guidance materials, identifies a contact for media inquiries and measures to ensure that all key stakeholders are notified of relevant information at the relevant times. The Panel notes and endorses the clarity of the approach taken in Queensland, where during an event, a website is updated at a set time on a daily basis to indicate any changes to water access.

All community and industry stakeholders should be notified of the same key information at the same time and no one group should have a monopoly on access. In the 2020 Northern Basin First Flush event, peak bodies played a key role in communications, and the incident management process should recognise this.

The enhanced communication plan should also identify an improved method of communicating restrictions and lifts to water users so that it can be understood in practical terms. For example, by maps with sufficient detail for individual landholders to determine their rights and obligations. This is essential to both enabling compliance by water users, and the ability for compliance action to be taken by NRAR, if required.

The framework should also be revised to identify clear methods to manage the flow of information between decision-makers and water users and communities during an event. It may be appropriate to identify local staff, or in the absence of local employees, contracted government officers from other agencies, who can be on stand-by for these purposes.

The incident management framework should also include provision for regular community updates about a first flush event to be published. Updates published by the CEWO in respect of the Northern Fish Flow and Northern Connectivity events are a good model for such updates. While it is not reasonable to expect the same quality of updates can be prepared for uncontrolled events as controlled and planned events, accessible, predictable regular updates drafted in plain English will give water users and the community the opportunity to understand the reasons for decisions in the context that they are being made, rather than decision-makers being forced to justify their actions with the benefit of hindsight and perfect information. Information on progress as water travels the length of the system will assist in appreciating the rationale behind the exercise.

The updates should aim to enhance community understanding of water management and provide the information in a way that is accessible and meaningful to communities. Maps could

be used to show the actual and forecasted progress of flows throughout the system, and indicate the objectives and targets achieved along the way.

Provision should also be made for the timely publication of water balance information for and outcomes of an event, after it has finished. This is key to improving trust in water management and demonstrating commitment to continuous improvement.

These improvements should be reflected in the published guidance materials referred to in recommendation 3, as and when they have been confirmed.

7. Embed the management of first flush events in the regulatory and policy framework for managing drought.

The Panel is of the view that the approach used to manage the 2020 Northern Basin First Flush event had a number of elements that would be appropriate to incorporate into longer term regulatory and policy instruments. Key issues were the lack of engagement, inadequate communication and a lack of transparency which ultimately led to unpredictability for communities and water users. That is not an ideal outcome. But more importantly, sole reliance on event based section 324 orders to manage first flush events does not provide the requisite certainty that first flows after extended dry periods will be protected to meet critical needs.

Therefore, the Panel recommends that elements of the approach similar to some of those used to manage the 2020 Northern Basin First Flush event, but with greater rigour and informed by consultation, be embedded in the WM Act, the Extreme Events Policy, water sharing plans and incident response guides, to reduce the reliance on section 324 orders and improve transparency and predictability. This is not to suggest a rewrite of current water sharing plan rules, but instead, extension of the current plans to deal with the increasing occurrence of extended dry periods and, as a consequence, first flush events.

The Panel recommends that in the first instance, first flush management is incorporated using a combination of 'hard' (imposed by law) and 'soft' (imposed by policy) requirements. Experience in first flush management across the whole of the Northern Basin is currently limited, and the current understanding of connectivity in the Northern Basin is limited. Therefore hard wiring targets (numbers) into legal instruments now would risk compromising environmental, social, cultural and economic outcomes. But in the first instance, the process for managing first flush events could be better embedded into the legislative framework, to reduce the reliance on section 324 orders.

As outlined in the table below, the objectives for first flush management could be incorporated into the WM Act, given their basin-wide application and that they derive from existing statutory obligations. The principles for allowing access could be included in the Extreme Events Policy, given their general application, level of detail and the likely need for the principles to be adjusted with time and experience.

Water sharing plan rules could establish the circumstances in which ordinary access rules are varied having regard to an extended dry period, and a process for how first flows are managed in those circumstances. This process could include the matters that need to be considered when setting targets, and how the community will know when take is restricted or permitted. Finally, incident response guides could be used to provide clarity on the targets required to meet critical needs as communities move in and out of stages of drought. Regular situation reports and updates will be required throughout the drought, both going into and coming out of the drought, with contingency actions, if those values are insufficient. An example of how the flush management could be embedded into the regulatory framework is set out below. However, any framework adopted should be developed in discussion with communities, Indigenous peoples and water users.

What will be set out?	Rationale	Example
WM Act		

What will be set out?	Rationale	Example
<ul style="list-style-type: none"> • Objectives for managing first flush events • Requirement for water sharing plans (WSPs) covering the Murray Darling Basin to include rules for first flush management which must provide, to the extent practicable, for: <ul style="list-style-type: none"> ○ connectivity within and between water sources, and ○ the protection of critical needs. 	<p>The objectives for first flushes should be consistent across all areas of the Basin and given their broad nature, should not change over time. They should also be tied to the existing legal requirements under the WM Act and the Basin Plan.</p>	<p>Objective of first flushes</p> <ul style="list-style-type: none"> • meet critical human needs – provide flow locally and downstream, particularly to replenish town water supply weir pools and provide water supply for basic landholder rights • meet critical environmental needs – provide flow along the length of the river systems to ensure re-connection of rivers and drought refuge pools.
Extreme Events Policy		
<ul style="list-style-type: none"> • Scope to be expanded to explain how water will be managed as intensity of drought reduces, as well as increases • Principles for allowing access to flows in first flush events 	<p>The principles for allowing access to flows should be consistent across all areas of the Basin.</p> <p>However, given the level of detail and likely need to adjust these with time and experience, it is not appropriate to embed these in the WM Act at this stage.</p>	<p>Principles</p> <ul style="list-style-type: none"> • Consider providing access to upstream water users under normal rules if the nearest downstream targets are met or forecast to be met and there is an assessment that this event will not meaningfully contribute to meeting any other downstream targets. • Where an event is predicted to meaningfully contribute to meeting the next downstream target, the temporary water restriction should not be lifted • When an event has met local targets and is no longer expected to contribute to meeting downstream targets or is in excess of that required to meet downstream targets, some local extraction relief could be allowed. • Temporary water restrictions should apply to a consistent upstream network of both unregulated and regulated rivers systems in a valley, to provide sufficient volumes of water to meet critical needs, avoid interceptions by extractors, and avoid inequitable sharing between users. • Early relaxation of upstream access restrictions prior to downstream targets being met should only occur if there is high confidence in downstream flow predictions meeting targets. • When flow predictions are used for early relaxation of restrictions on upstream access, river system distribution efficiency assumptions should reflect the antecedent extended dry conditions

What will be set out?	Rationale	Example
Water Sharing Plans		
<ul style="list-style-type: none"> Describe and establish the point at which first flush rules kick in (triggers for first flush management) Describe the process to be followed to achieve the objective of first flush events in the relevant water source: <ul style="list-style-type: none"> what critical needs will be provided for what local factors are to be considered (e.g. channel capacity) how requirements for the critical needs (targets) are to be quantified how the community will know when take is restricted or permitted Require Incident Response Guides to set out critical needs at each stage of drought 	<p>The procedure for managing first flush events should take into account unique local factors.</p> <p>Embedding this in WSPs will provide transparency and certainty to community members that relevant matters will be taken into account, and how the water source will be managed. Embedding triggers for first flush management will ensure that water sharing plans are better equipped to deal with drought scenarios and will avoid the need for section 324 orders to override water sharing plan rules.</p> <p>Implementation will require quantifying native title / cultural rights and developing reasonable use guidelines</p>	<p>Trigger for first flush rules</p> <ul style="list-style-type: none"> Normal access rules cease to apply when the decision-maker determines that a water source is in stage 4 drought Instead, access is only allowed by Ministerial announcement Generally, the decision-maker must not allow access unless satisfied that the requirements for the following critical needs have been, or are forecast to be met: <ul style="list-style-type: none"> stock and domestic watering (under Basic Landholder Rights) native title rights town water supply for X years the critical environmental needs in the specific water source However, access may be permitted where the decision-maker is satisfied that access will not compromise the ability to provide for critical in-stream or downstream needs The decision-maker is to determine the requirements to meet critical needs having regard to: <ul style="list-style-type: none"> Long term water plan Antecedent conditions Advice from a local committee <p>Announcements are to be published on XX website at YY time.</p>
Incident Response Guides		
<p>Updated based on the WSP process at each stage of drought to identify</p> <ul style="list-style-type: none"> What are the specific needs for the WSP area? What are the current antecedent conditions? What are the targets (numbers) required to meet the specific needs, based on the antecedent conditions? how first flush targets can be modified during an event if circumstances warrant 	<p>Provides transparency to targets but enables best available evidence to be taken into account at the time it is required.</p>	<p>Example targets</p> <p>As at [insert date]:</p> <ul style="list-style-type: none"> River Gauge A: XW ML River Gauge B: XY ML River Gauge C: XZ ML

Over time, as experience grows, more details can be moved from policies into water sharing plans, enhancing certainty for communities, water users and water agency decision-makers.

Embedding first flush rules in water sharing plans may lead to questions of compensation that will need to be addressed. In these circumstances, it would be appropriate to review the risk sharing provisions of the National Water Initiative.

8. Improve flow forecasting modelling and real-time monitoring capability, including measurement of extractions and the hydrometric system for inflows and monitoring end of system flows

The Panel notes that, in a world first, the NSW Government used LiDAR sensor technology to estimate the volume of floodplain harvesting captured in private water storages in the Northern Basin valleys during the Northern Basin First Flush event. New non-urban metering (including telemetry) requirements are in the process of being rolled out.

Further, WaterNSW is currently:

-
- completing and integrating its eWater Source model for the Barwon-Darling to support and integrate with the CARM (Computer Aided River Management) operational model,
 - using a hydrodynamic model incorporating LiDAR and recent bathymetric surveys to improve forecasting of distribution efficiencies in the future and assist in forecasting flows along the river, especially during low flow periods, and
 - developing hydrodynamic models of the Barwon-Darling river system, using detailed topographic data to improve understanding of channel dynamics/storage and floodplain flow.⁵⁹

Increasing the capability for real time monitoring of flows and extractions and improving the general understanding of flow behaviour at both low flow and high flow scenarios is essential to improving management of first flushes. It is essential that NSW also works closely with Queensland in this regard to improve the monitoring and forecasting of flows entering NSW from Queensland.

9. Current (and future) reform programs should be accompanied by clear implementation plans and regular communication of progress to the public.

A number of programs already in place will, when implemented, lead to strong benefits to improved first flush management. This includes the efficient roll out of metering and telemetry requirements and work to improve the understanding of connectivity across the Northern Basin.

Bringing floodplain harvesting into the full regulatory, monitoring and compliance framework is an essential element of the way forward.

The 2020 Northern Basin First Flush event demonstrates that it is not enough to just state the intent to improve management and protection of water resources. Levels of both water literacy and confidence in NSW water management are low. There is a lack of faith that any real changes are being, or will be, made and thus a lack of trust in what is done.

This is reinforced by lengthy implementation processes currently in place, or needed. In some cases, the reforms simply take time. But progress should be regularly updated and communicated to the public so it is not confused for inaction. Communities need to be confident that the Government is going to do what it says it will do, when it said it would do it. Progress needs to be updated and readily accessible to the community when it looks for it. Circumstances change and timeframes can't always be met. But these changes also need to be communicated to the public.

10. Improve and resource communication coordination and capability.

Water regulation is a complex science. But the current labyrinth of water information is an additional and significant barrier to improving water literacy. Trust in water management needs to be rebuilt, and this can only be done with making information more accessible, authoritative and understandable, not simply available.

Getting the balance right requires all engagement of all stakeholders across the community. It's not possible for communities to be engaged in an informed discussion without information. The issues are complex enough, without the added burden of misinformation and a lack of transparency.

There needs to be one point of truth for information. The Panel is aware that some work is already underway at the Commonwealth level to develop a 'one-stop shop' for water information. Nevertheless, useful and helpful work can still be progressed now to improve the quality and accessibility of communications.

⁵⁹ Written submission of WaterNSW dated June 2020.

Further investment is needed in introductory information like a range of induction manuals targeted at different groups, accessible to the community, and new participants in the water sector. There needs to be a clear picture of how various water reform projects interact with each other.

Improving the quality of communication will require additional resources, but it is an investment that can lead to returns across the board for water management. Information needs to be tailored to suit different audiences - those with a general interest in water, and those who require more detail to properly plan commercial activities.

Finally, regulatory changes must be communicated to the public before they commence. Floodplain harvesting remains a very contentious issue,⁶⁰ but it has been compounded by insufficient communications. The current levels of mistrust in water management, and the importance of water management to the community, means regulatory changes cannot go unannounced.

Next steps

This draft report will be placed on public exhibition from 13 July 2020 to 9 August 2020, seeking the community's written feedback. An information webinar is scheduled for Monday 27 July from 1.00pm to 2:30pm. The Terms of Reference currently provide that the final report is due to be submitted no later than 31 August 2020.

⁶⁰ Evidenced in the written submissions of the Inland Rivers Network dated 7 June 2020 and the Nature Conservation Council dated 9 June 2020.

Appendix A – Terms of Reference

INDEPENDENT ASSESSMENT OF THE MANAGEMENT OF THE NORTHERN BASIN FIRST FLUSH EVENT

The NSW Government has requested an independent assessment of the management of the first flush event following the 2018/2019 drought in the Northern Basin.

The review will be conducted by an independent panel including Wendy Craik and Greg Claydon, and informed by public consultation with industry, environmental, Aboriginal and town water supply representatives, and experts in incident management.

Objectives of the Assessment

The objectives of the assessment are as follows:

1. Provide transparency about the decision-making processes that were used to manage the event under the *Water Management Act 2000*.
2. Recommend strategies to improve the management of first flush events under the *Water Management Act 2000* in the future, including:
 - (a) system and process changes which would improve the management of a first flush event by Department of Planning, Industry & Environment – Water (DPIE Water), the Natural Resources Access Regulator (NRAR) and WaterNSW, and
 - (b) regulatory, planning or policy changes (including to relevant water sharing plans) which would improve the management of a first flush event.

How the Assessment is to be carried out

In undertaking the assessment, the independent panel should review and consider:

- the DPIE Water, NRAR and WaterNSW planning, systems and processes that were used to manage the event, with particular regard to:
 - decision making processes, including the availability of information and evidence to support decision-making pursuant to the public interest test (including, but not limited to, information to assist in forecasting inflows from Queensland tributaries)
 - communication with water users, the general public and between agencies
 - the resourcing and incident management capability of DPIE Water, NRAR and WaterNSW (including risk management and WHS implications)
- the extent to which management of the event satisfied relevant aspects of the NSW Government's response to the Independent investigation into NSW water management and compliance by Ken Matthews (being the NSW Government water reform action plan⁶¹) and the Vertessy Report and the Natural Resources Commission's Review of the Barwon-Darling Water Sharing Plan⁶²
- the effectiveness of the current and proposed regulatory and policy tools for managing a first flush event
- any other matters the Panel considers relevant to achieving the objectives of the assessment.

The independent panel should also:

- conduct interviews with relevant NSW and Commonwealth agencies

⁶¹ Available at https://www.industry.nsw.gov.au/__data/assets/pdf_file/0016/136204/nsw-government-water-reform-action-plan.pdf

⁶² Available at https://www.industry.nsw.gov.au/__data/assets/pdf_file/0008/279080/NSW-Government-response-to-NRC-report.pdf

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- obtain the advice of key industry, environmental, indigenous and local government stakeholders via a water user reference group
 - engage and seek advice from relevant experts (as required)
 - provide a draft report to the Secretary of the Department of Planning, Industry & Environment by 30 June 2020
 - undertake public consultation for and on the draft report⁶³
 - provide a final report to the Secretary of the Department of Planning, Industry & Environment no later than 31 August 2020.

The draft and final report of the independent panel will be released publicly.

Background

In mid-January and early February 2020, northern NSW experienced the first rainfall events following record drought conditions. A series of temporary water restrictions were introduced, including to restrict the take of water by floodplain harvesting works, to actively manage the first flows and prioritise water security for critical human needs.

⁶³ Consultation will be carried out in accordance with relevant public health advice.

Appendix B – Panel Member Biographies

Dr Wendy Craik

Wendy has over 25 years' experience in senior roles in public policy, including as Commissioner of the Productivity Commission, Chief Executive of the Murry-Darling Basin Commission, President of the National Competition Council, Chair of the Australian Fisheries Management Authority and Australian Rural Leadership Foundation, Executive Director of the National Farmers' Federation and Executive Officer of the Great Barrier Marine Park Authority. She has been a director on a number of boards. Wendy is currently the Chair of the Climate Change Authority and a board member of the Reserve Bank of Australia and Australian Farm Institute. Wendy was invested as a Member of the Order of Australia in 2007 for service to the natural resource sector of the economy, particularly in the areas of fisheries, marine ecology and management of water reform, and for contributions to policies affecting rural and regional Australia.

Greg Claydon

Greg Claydon has extensive water industry and natural resources management knowledge, experience and achievements, built on his roles as a senior executive with Queensland and Western Australia state government water, environment and natural resources agencies. He is recognised at state, national and international levels for his work in water and natural resources reforms. Greg has been actively involved in several interjurisdictional water and natural resources initiatives, including those covering the Council of Australian Governments (CoAG), the Murray-Darling Basin, the Queensland/New South Wales Border Rivers, the Lake Eyre Basin, the Great Artesian Basin and the Ord River Basin. He also has specific professional experience in the design, construction, and management of irrigation, water supply and drainage schemes in tropical, sub-tropical and semi-arid environments. Greg has been a director on a number of boards and co-led an independent review of the NSW floodplain harvesting policy implementation in 2019. Greg was awarded a Public Service Medal (PSM) in 2009 by the Governor-General of Australia for outstanding public service in natural resources management and water reform.

Appendix C – Government Responses to Matthews Inquiry, Vertessy Report and NRC Review

NSW Government Water Reform Action Plan (Response to Matthews reports)

What we are doing	How we will do it
Introduce best practice for water management	
Established a new Lands and Water division	Create a division solely focused on the management of land and water resources
Establishing a new regulatory framework for water management	Legislate to establish an independent regulator— Natural Resources Access Regulator (NRAR)
	Appoint an interim chief regulatory officer
	Appoint an independent board to oversee the NRAR
	Appoint a chief regulatory officer
	Develop and publish the Natural Resources Access Regulator Establishment Plan
Define and explain the specific roles of government bodies that have accountability for water management	Clarify the accountabilities of departments and agencies with water management responsibilities in NSW
	Create clear functional separation between those who provide and sell water to customers and those who oversee and regulate water as a public resource
	Make information on accountability and roles publicly available
Build a compliance and enforcement regime that ensures strong and certain regulation	
Strengthening compliance and enforcement capacity	Increase compliance and enforcement resourcing by \$9.5 million per year
	Recruit additional compliance and enforcement officers
	Conduct additional training for all compliance and enforcement staff including in investigation techniques
	Invest in case management technology, databases and analytics to more effectively target compliance activity
	Report annually on compliance and enforcement activities and publish on the Department of Industry website
Establish a new independent regulator with strong regulatory powers	Natural Resources Access Regulator (NRAR) to lead on compliance matters
	NRAR to take appropriate enforcement action, including penalty infringement notices and prosecutions
	WaterNSW to implement mandatory immediate reporting to the NRAR of suspected breaches

What we are doing	How we will do it
	NRAR to produce and publish clear and effective policies and processes for compliance that also address the recommendations of the Matthews and NSW ombudsman reports and the MDBA's water compliance review
	NRAR to undertake proactive targeted compliance operations
Implement a robust metering framework	Consult on a metering and water discussion paper for public consultation incorporating: <ul style="list-style-type: none"> • an approach to implementing 'no meter, no pump' objectives • identification of any necessary legislative reforms to support these changes • how we monitor metering of water consumption • policy on self-reporting and random checks
	Finalise a timetable for implementing new metering requirements following consultation
Adopt innovative technologies to improve compliance effectiveness	Seek proposals to pilot the use of technology for water monitoring and compliance activities, which could include remote sensing of on-farm water storages and indicators such as crop growth and telemetry
	Develop a water monitoring technology plan
Ensure transparency in how we share, allocate and manage water	
Increase transparency in water management	Release a discussion paper on creating a public register of water information that could cover water entitlements, water licences and water work approvals
	Publish compliance and enforcement activities
	Publish information on the Department of Industry's website about activities in protecting environmental water
	Regularly report on progress implementing water inquiry reforms
	Have NRAR establish mechanisms for the public to report alleged breaches, including a statewide hotline and email channel
	Commission an annual, independent review of progress on this plan and publish the results
	Redesign the Department of Industry website to provide updated and more accessible information on water management
Create a stakeholder engagement framework	Implement a new stakeholder engagement framework
	Develop and publish a schedule of stakeholder engagement activities
Better manage environmental water	Establish an interagency working group to develop solutions to improve the management of environmental water

What we are doing	How we will do it
	Have the working group present interim solutions within 90 days of commencement
	Publish explanatory materials to inform the public on how environmental water is managed
	Have all NSW water resource plans accredited by the MDBA
Build capability to support implementation of water reforms	
Build capability, improve standards and embed an ethical culture	Update staff induction processes to emphasise ethical and conduct obligations of staff
	Roll out department-wide ethics and professional standards training
	Commence a 'speak-up' service to enable anonymous reporting of suspected unsatisfactory conduct
	Develop the Department of Industry ethical framework to connect all training, systems and activities to embed ethical behaviour into departmental culture

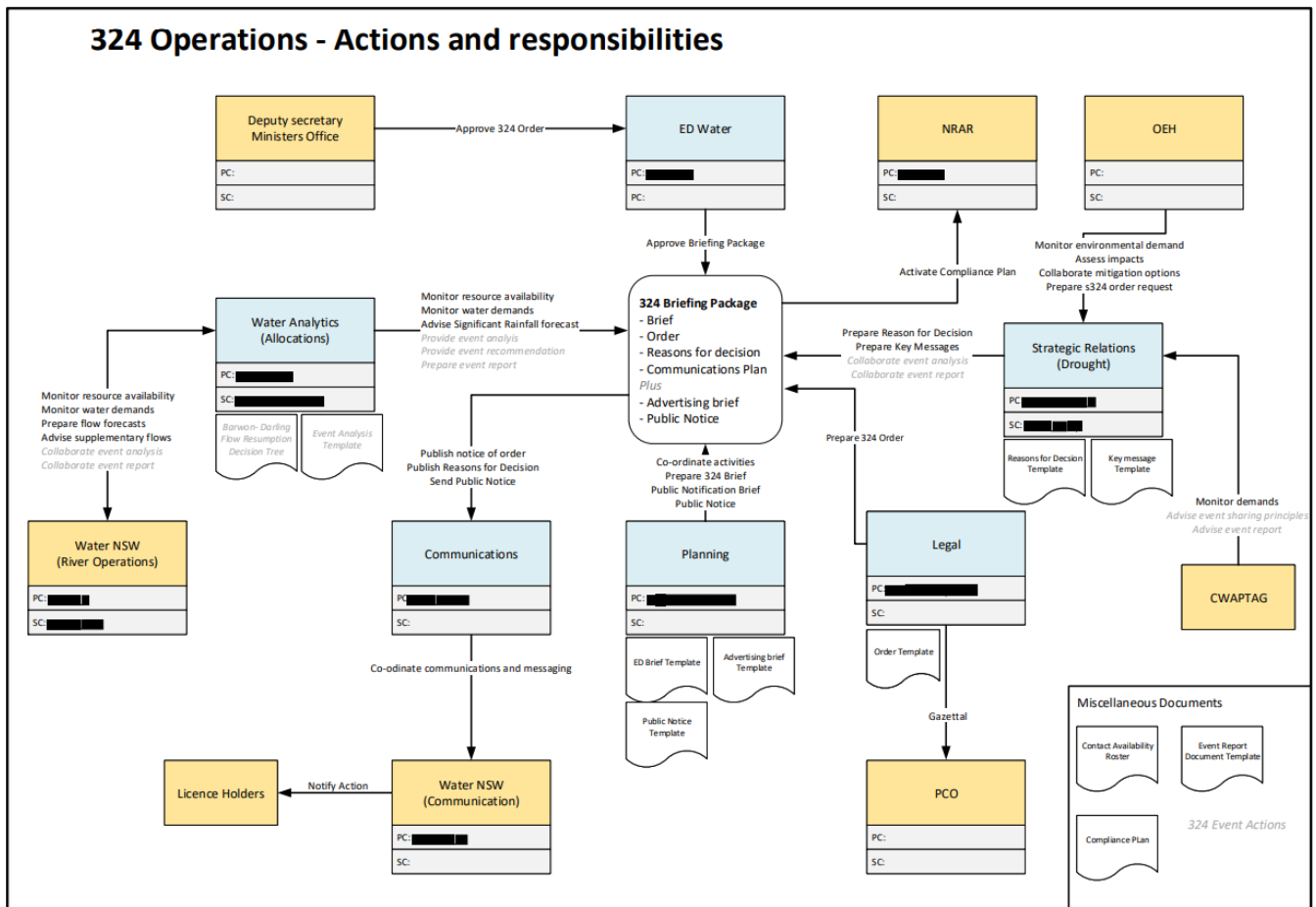
NSW Government response to Vertessy Report and the Natural Resources Commission's Review of the Barwon-Darling Water Sharing Plan

What we are doing	How we will do it
Stage 1: Implement actions to better manage environmental water and the health of fish populations	
Action 1.1: Manage risks to fish health and contribute to native fish recovery	Short term emergency response measures in response to fish deaths
	Monitor fish populations to better understand the impacts of recent fish deaths on the remaining fish populations
	<ul style="list-style-type: none"> Continue to identify sites across the entire NSW Murray–Darling Basin that are key to the long-term maintenance of fish populations, and assess the risk factors that could result in fish deaths at each site Identify the range of technological interventions available, such as de-stratification and oxygenation, to reduce the potential for fish deaths at key sites Prioritise intervention actions for the key sites Continue monitoring activities at key sites to assess the impact of any deployed intervention
	Develop and adopt a communication strategy that informs and involves communities and agencies across the Basin.
	Continue to contribute to and implement measures that will help recovery of native fish populations and river health across the Basin, including through the Northern Basin Toolkit and the Native Fish Management and Recovery Strategy.
	Work with the Australian Government to remove barriers to fish

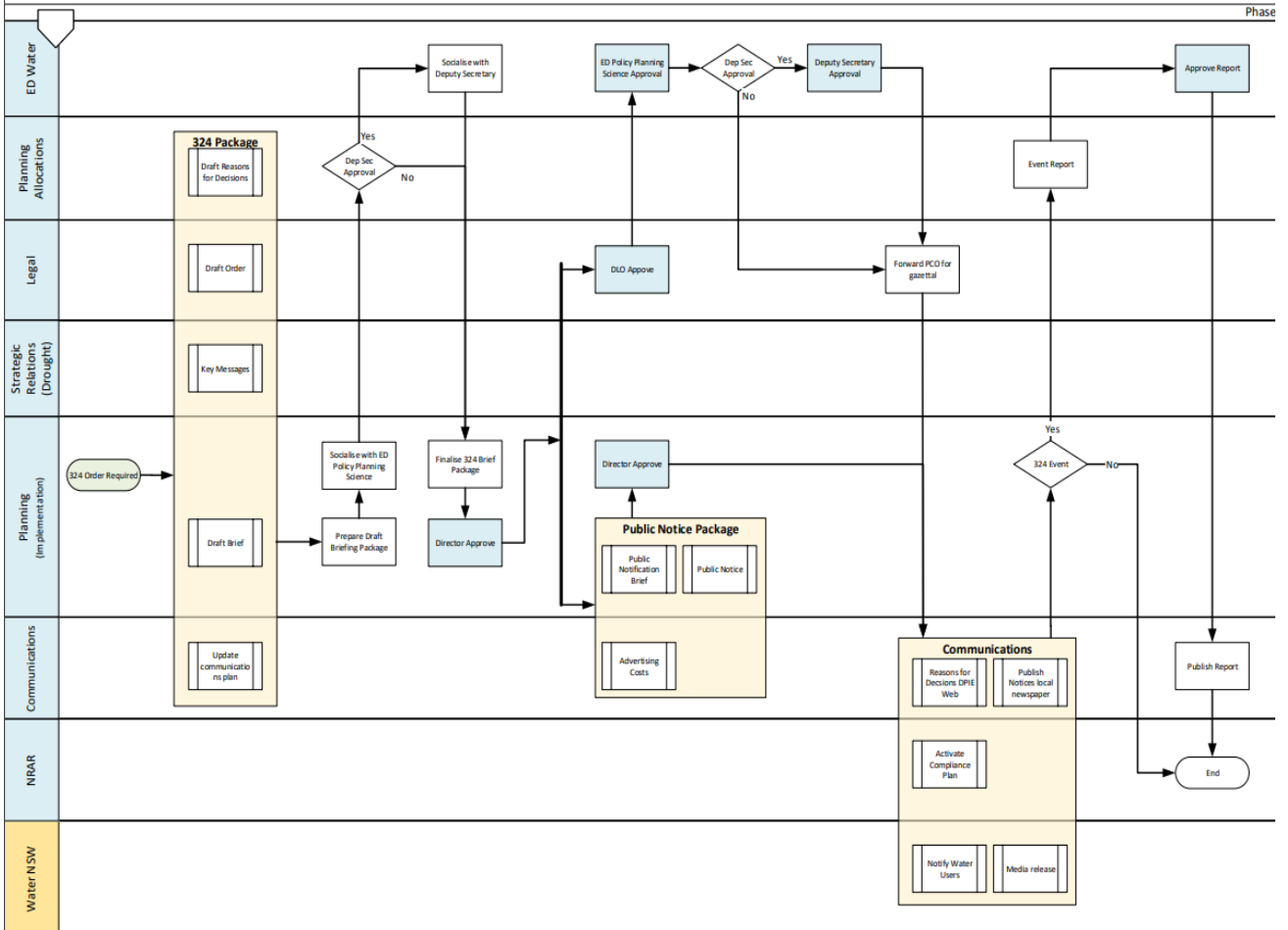
What we are doing	How we will do it
	movement and enhance river connectivity at existing weirs and regulators in the Lower Darling and Menindee areas.
Action 1.2: Implement rule changes in response the NRC's recommendations to protect low flows	Listen to the community's views on proposed changes to A Class licence pumping thresholds
	Seek the views of communities on the NRC's proposed removal of clauses in the Barwon-Darling Water Sharing Plan that can provide irrigators with access to low and no-flows before an anticipated flow event reaches normal pumping levels (the 'imminent flow' rule) No
	Not permit the taking of water under imminent flow rule until a decision on that rule is finalised Yes
Action 1.2 Immediately protect water for towns and the environment	Use mechanisms such as temporary water restriction orders to manage specific issues while consulting with the community on proposed rule changes
Action 1.3: Implement our commitments to better manage environmental water	Making changes to introduce rules to manage the resumption of flows in the river following extended dry periods
	Implementing individual daily extraction limits (IDELs) for licence holders
	Preventing the extraction of environmental water so it can remain in the river and achieve the desired environmental and social outcomes
	Listen to community views on proposed changes to A Class licence threshold that the NRC has recommended. Reforms will be developed with input from the community and stakeholders.
	Improve the way we track our progress against water sharing plan objectives—we are developing SMART (specific, measurable, achievable, relevant and time-based) objectives and robust monitoring, evaluation and reporting (MER) plans for all systems across the state, including the Barwon–Darling
	Develop environmental watering requirements as part of the long-term water plans (LTWPs) to support the protection of ecological assets
	Look closely at how we can improve connectivity between northern Basin river systems by undertaking a review of water sharing plan rules that could contribute to this.
Support the Commonwealth buyback of A Class licences	Ask the Commonwealth to transfer some of the bought-back A class licences to Aboriginal ownership for cultural use. Feedback is that this will lead to better environmental, socio-economic and cultural outcomes in the Barwon–Darling.
Stage 2: Explore options for amending the Menindee Lakes Water Saving Project and improving Aboriginal outcomes	
Action 2.1: Explore options	Work with key agencies involved in NSW water management and Aboriginal groups to explore options for an Aboriginal water policy with the aim of improving

What we are doing	How we will do it
for an Aboriginal water policy	the representation of Aboriginal cultural interests and values in water management.
Action 2.2: Amend objectives for the Menindee Water Saving Project	Work with the local community to design the project in a way that meets their needs. Changes to the project will involve the Commonwealth and other Basin jurisdictions.
Stage 3: Make further improvements based on evidence	
Action 3.1: Remake of the water sharing plan in 2023 informed by evidence gathered over time	We will put in place an effective monitoring, evaluation and reporting framework to understand how far the changes in Stage 1 and 2 of our response outlined in this document go towards improving environmental, social and cultural outcomes in the Barwon–Darling.
	Work closely with stakeholders to gather evidence through this process and to decide whether further changes are needed when the Barwon–Darling Water Sharing Plan is remade in 2023.
	Working with Queensland will also be a key focus, as water management in Queensland has a significant impact on water flowing into NSW.

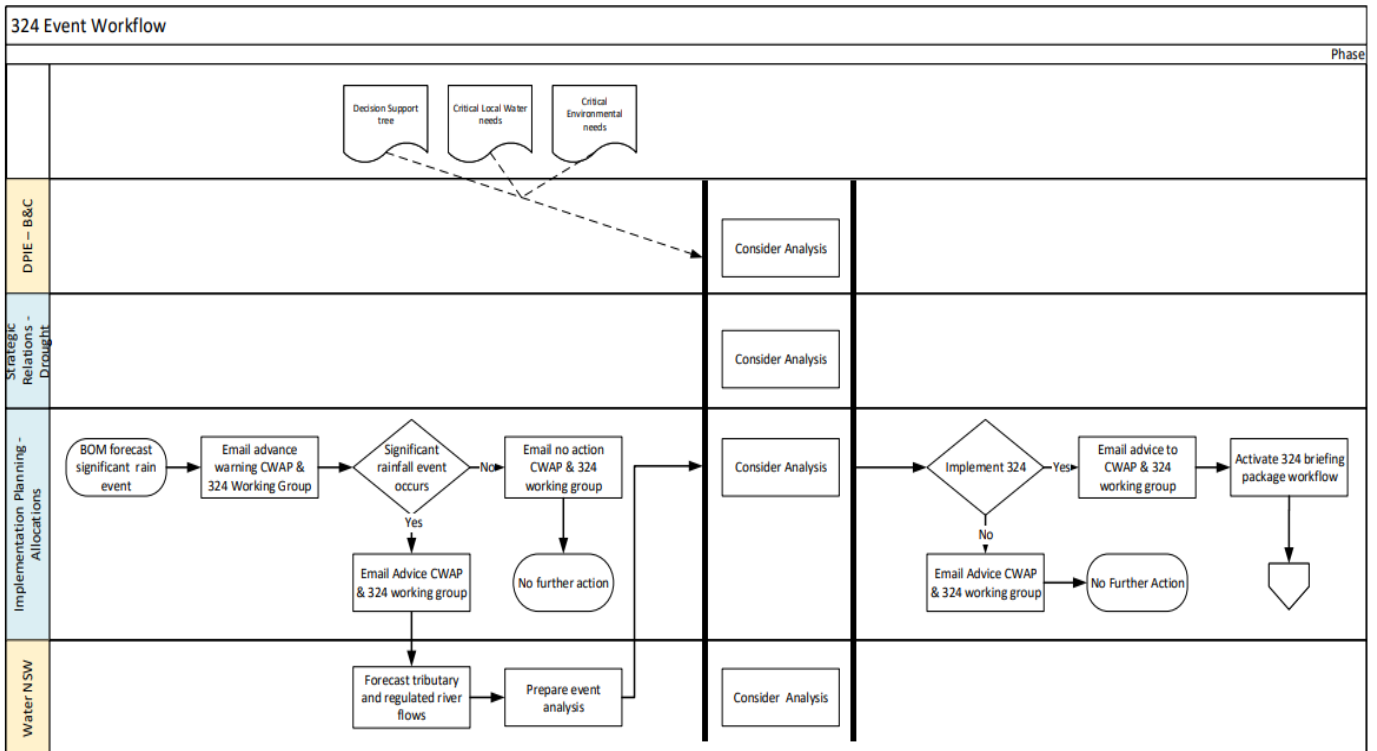
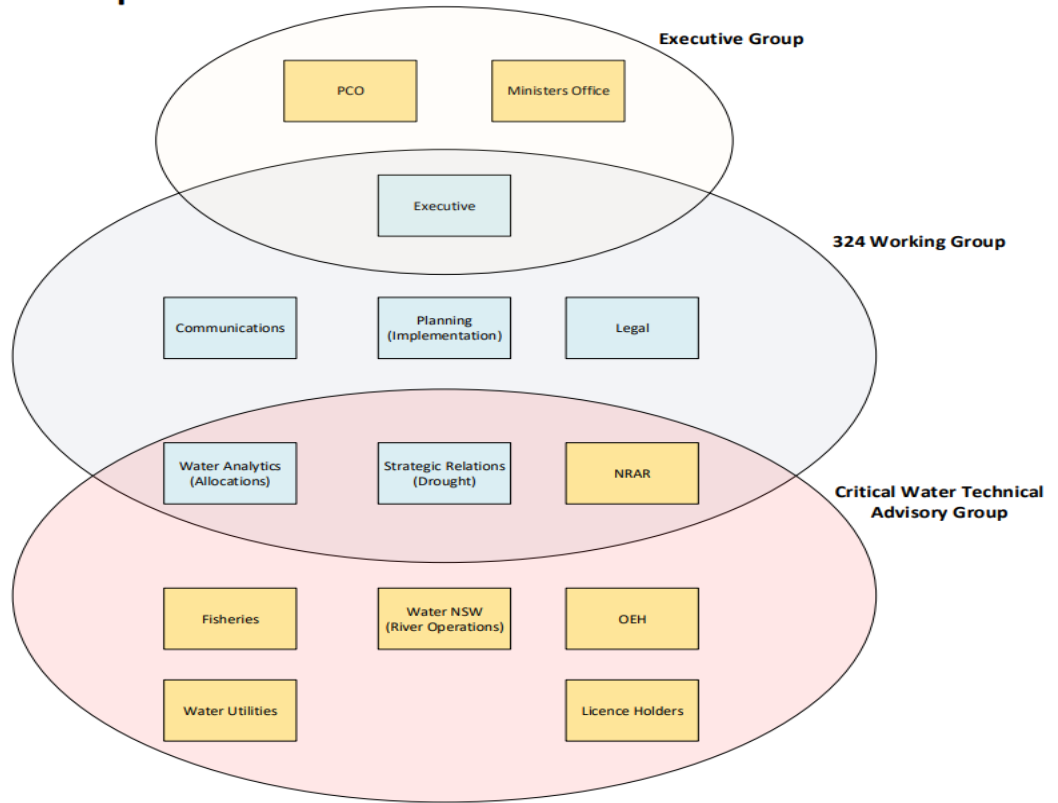
Appendix D – Flowcharts of temporary water restriction processes



324 Briefing Package Workflow



324 Operations Groups



Appendix E – Proposal for the proactive temporary water restriction

Concept: pre-emptive 324 temporary water restriction on northern uncontrolled flows

Discussion points

WHAT:

- A proposal for a temporary water restriction to proactively manage and protect future inflows upstream and downstream of storages and bring forward system recovery.
- The initial aim would be to ensure that the local critical needs are met with the first inflow volumes and also to facilitate downstream system wetting, ultimately to meet Lower Darling.
- Objective: to address critical water needs (town water supply, basic landholder rights, high security and critical in-stream needs) in the northern catchments and the Barwon-Darling/Lower Darling systems, and maximise the prospects of early system recovery.

WHY:

- All northern regulated valleys and Barwon-Darling Lower Darling are in Stage 3 severe or Stage 4 critical drought.
- Many town weir supplies are vulnerable, domestic and stock replenishments have been scant, connectivity along the Barwon-Darling has been sporadic and brief, and non-existent into the Lower Darling, drought refuge pools are limited and could again present an unacceptably high risk of a recurrence of fish deaths.
- With the recent wetting of parts of the Barwon-Darling River by environmental water releases in the upper reaches, flows from the Culgoa to Bourke and from the Warrego to Menindee, the system is well primed to respond to winter inflows, meaning protecting upstream flows will maximise the prospects of water reaching Menindee and ultimately connecting to the refuge pools in the Lower Darling.

Current approach:

- Restrictions are applied on an event-by-event basis as uncontrolled inflows occur.
- We have challenges assessing early an emerging event and gazetting restrictions as required.
- We have challenges managing expectations of water users and ensuring they are aware that the order is in place to avoid compliance issues.

Proposal:

- Applying the restriction in advance (pre-emptively), ahead of any uncontrolled flows, to give certainty and ensure immediate protection.
- Provide transparency for affected water users about when a restriction applies and when it might be lifted.
- Provide transparency for regulated river water users about when supplementary access might be announced.

WHO:

- Restrictions would apply to **unregulated river access licence holders** (excluding those associated with town water supply or other higher priority purposes) – in the Barwon-Darling, and northern tributaries upstream and downstream of the storages, including the Border Rivers, Gwydir, Namoi, Castlereagh, Macquarie and Bogan unregulated river catchments.
- Restrictions would not explicitly apply to **regulated river general security licence holders**. Details below.
- Restrictions would not explicitly apply to **regulated river supplementary access licence holders**. Details below.

HOW:

River pumping would not be permitted by unregulated river licence holders below “bank full” flow conditions unless the following conditions have been met:

- Town water weirs replenished within last 120 days
- Basic landholder right access, domestic and stock access, local in-stream connectivity and pool replenishment, within the last 90 days
- High security access within the last 90 days
- Connectivity of flow along the main stem Barwon-Darling River within last 120 days
- Flow between 40-60 GL into Menindee Lakes for Lower Darling pools.

The pumping restriction could be considered as augmenting the existing cease to pump / take rules of the water sharing plan for the respective unregulated river water sources.

Although restrictions would not explicitly apply to regulated river general security access licence holders, WaterNSW may decline water orders that are inconsistent with, or that adversely impact upon, primary flow objectives. It should be noted that very small volumes of general security carryover water is currently in accounts.

Supplementary access by regulated river users would not be made available until the above criteria had been met. However consideration would be given to announcing a volume of supplementary access commensurate with the overbank flow volume that is estimated will not return to the river. This could occur at localised choke or effluent points.

Flows and conditions will be monitored against these criteria. Water users can be kept up to date with the prospects of water access through water user forums, drought engagement meetings and water allocation statements. Restrictions will be promptly lifted and water users advised once some sustained system recovery is achieved.

Some sustained system recovery might include three of the following five targets being met simultaneously:

- 50 GL or more received at Menindee Lakes in the past 6 months
- over 50 ML/d flow at Wilcannia
- over 200 ML/d flow at Bourke
- over 500 ML/d flow at Walgett
- over 500 ML/d flow at Boggabilla.

Appendix F – Flow Targets for the 2020 Northern Basin First Flush Event

Target location	Original criteria for environmental needs	Adopted volumetric targets for considering lifting restrictions – where the event is predicted to provide the following total flow volume
Barwon-Darling		
Barwon River at Collarenebri 422003	>280 ML/d (10 days)	2,800 ML
Barwon River at Dangar Bridge 422001	>320 ML/d (10 days)	3,200 ML
Barwon River at Brewarrina 422002	>500 ML/d (10 days)	5,000 ML
Darling River at Bourke 425003	>500 ML/d (10 days)	5,000 ML
Darling River at Wilcannia 425008	>350 ML/d (10 days)	3,500 ML
Border Rivers		
Severn River at Ashford 416006	>40 ML/d (10 days)	400 ML
Macintyre River at Ridgeland 416031	>210 ML/d (10 days)	2,100 ML
Macintyre at Boggabilla 416002	>230 ML/d (10 days)	2,300 ML

Target location	Original criteria for environmental needs	Adopted volumetric targets for considering lifting restrictions – where the event is predicted to provide the following total flow volume
Macintyre at Goondiwindi 416201A	>120 ML/d (10 days)	1,200 ML
Macintyre u/s Boomi 416043	>60 ML/d (10 days)	600 ML
Boomi River at Boomi Weir Offtake 416037	>5 ML/d (10 days)	50 ML
Barwon River at Mungindi 416001	>300 ML/d (10 days)	3,000 ML
Gwydir		
Gwydir River including Gwydir Wetlands		
Gwydir @ Gravesend 418013	>440 ML/d (10 days)	4,400 ML
Gwydir @ Yarraman 418004	>240 ML/d (10 days)	2,400 ML
Lower Gwydir Gwydir DS Tyreel 418063	>100 ML/d (10 days)	1,000 ML
Central Lower Gwydir	>6,000 ML event with a maximum period between flows (ie maximum interflow) of 1 yr (418066 Millewa) >36GL maximum interflow 2 yr (418078 Allambie)	>6,000 ML event maximum interflow 1 yr >36GL maximum interflow 2 yr (418078 Allambie)

Target location	Original criteria for environmental needs	Adopted volumetric targets for considering lifting restrictions – where the event is predicted to provide the following total flow volume
Gingham watercourse		
Gingham @ Teralba 418074	>100 ML/d (10 days)	1,000 ML
Central Gingham Gingham @ Tillaloo 418076	>15 GL event maximum interflow 1 yr >30 GL event maximum interflow 2 yr	>15 GL event maximum interflow 1 yr >30 GL event maximum interflow 2 yr
Lower Gingham Gingham @ Gingham Brd 418079	>3GL event maximum interflow 1 yr >15GL event maximum interflow 2 yr	>3GL event maximum interflow 1 yr >15GL event maximum interflow 2 yr
Mehi River inc. Mallowa and Moomin		
Mehi @ Moree 418002	>130 ML/d (10 days)	1,300 ML
Mehi near Collarenebri 418055	>40 ML/d (10 days)	400 ML
Moomin Creek at Combadello 418048	>30 ML/d (10 days)	300 ML
Mehi and Mallowa wetlands	>3GL event maximum interflow 18 mth >8GL event maximum interflow 2 yr	>3GL event maximum interflow 18 mth >8GL event maximum interflow 2 yr
Mallowa creek at regulator 418049	>10 ML/d (10 days)	100 ML

Target location	Original criteria for environmental needs	Adopted volumetric targets for considering lifting restrictions – where the event is predicted to provide the following total flow volume
Carole/Gil		
Carole near Garah 418052	>70 ML/d (10 days)	700 ML
Namoi		
Namoi River at Manilla 419022	>70 ML/d (10 days)	700 ML
Namoi River at Gunnedah 419001	>200 ML/d (10 days)	2,000 ML
Namoi River at Mollee 419039	>200 ML/d (10 days)	2,000 ML
Namoi River upstream of Walgett 419091	>30 ML/d (10 days)	300 ML
Pian Creek at Waminda 419049	>50 ML/d (10 days)	500 ML
Peel River at Piallamore 419015	> 100 ML/d (10 days)	1,000 ML
Peel River at Carroll 419006	>100 ML/d (10 days)	1,000 ML

Target location	Original criteria for environmental needs	Adopted volumetric targets for considering lifting restrictions – where the event is predicted to provide the following total flow volume
Macquarie		
Macquarie at Barooka 421001	>200ML (10 days)	2,000 ML
Macquarie at Warren (@ Warren Weir) 421004	>200ML (10 days)	2,000 ML
Macquarie River Marebone Weir inflows (@combined Marebone Break & Macquarie River below Marebone gauges) 421088 + 421090	>100 ML/d (10 days)	1,000 ML
Streams between Marebone Weir and the Macquarie Marshes (@combined Macquarie River & Marebone Break below Marebone gauges) 421088 + 421090 * excluding take	>65 ML/d (10 days)	650 ML
Inner core of Macquarie Marshes wetland system Northern, Southern & Eastern Marshes (@combined Macquarie River & Marebone Break below Marebone gauges) 421088 + 421090	For core wetlands: 60,000 ML event maximum interflow period 18 months - 2 years over 3-4 months	# For core wetlands: 60,000 ML total volume over 3 to 4 months

Source: *Information Sheet: Northern Basin temporary water restrictions: targets and principles*, published by DPIE Water, May 2020 available at https://www.industry.nsw.gov.au/__data/assets/pdf_file/0015/301416/northern-basin-restriction-triggers-and-principles-fact-sheet.pdf.

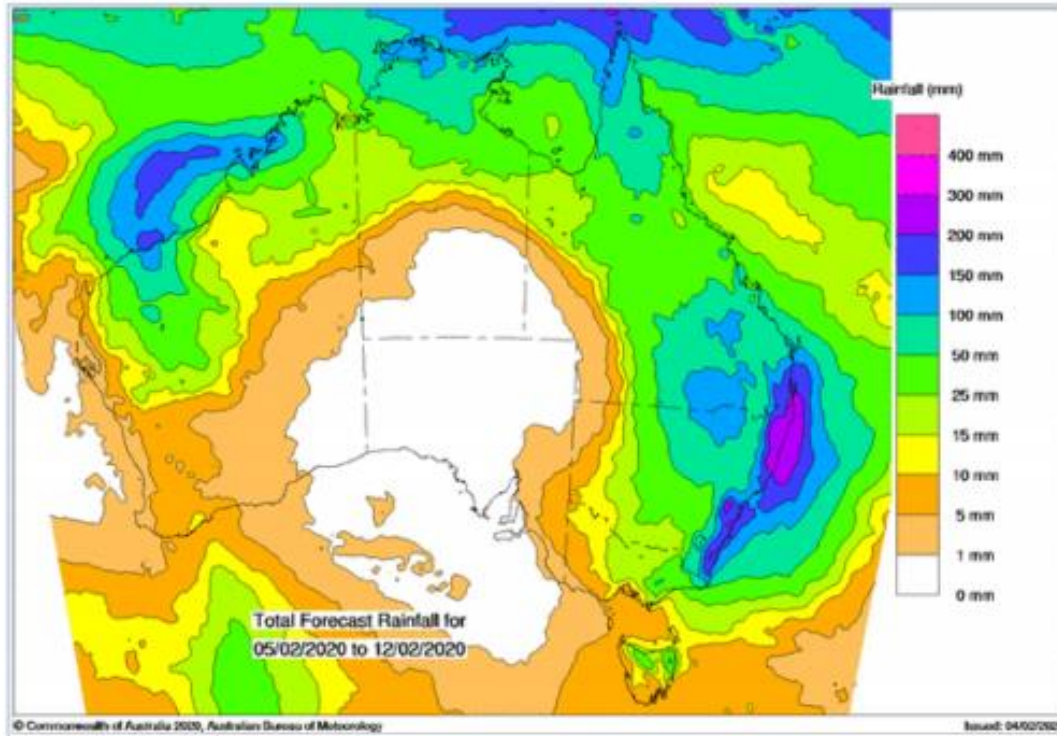
Appendix G – Decision Tree for Northern Valleys Flow Event



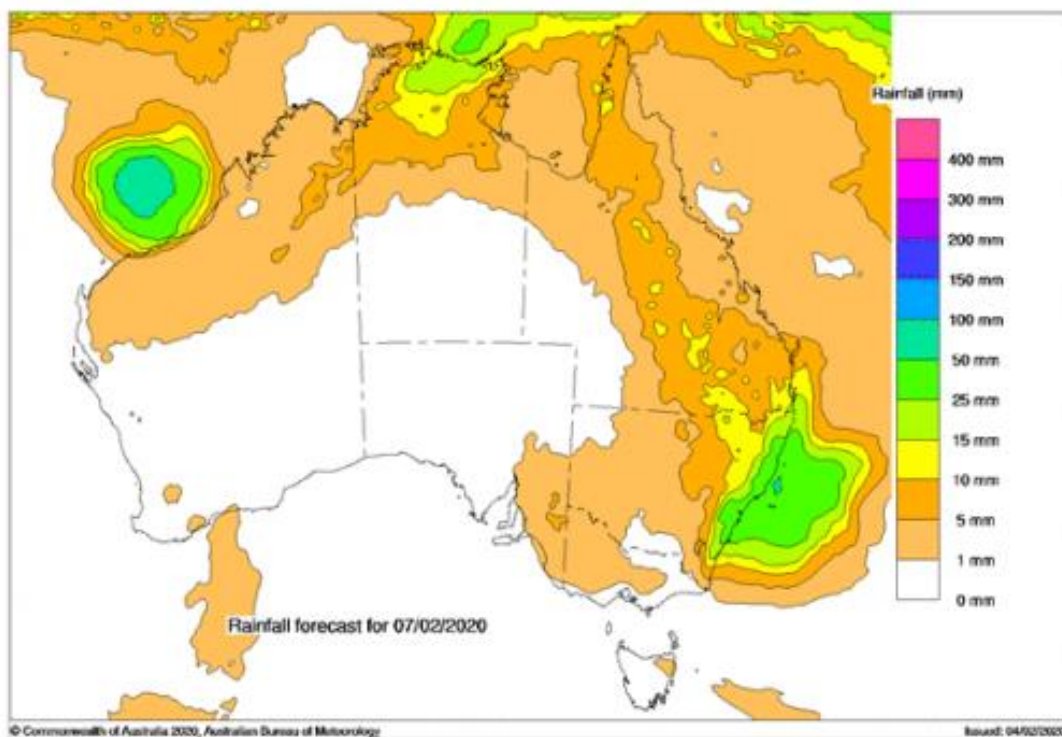
Appendix H – Bureau of Meteorology Forecasts

Bureau of Meteorology Rainfall Forecasts

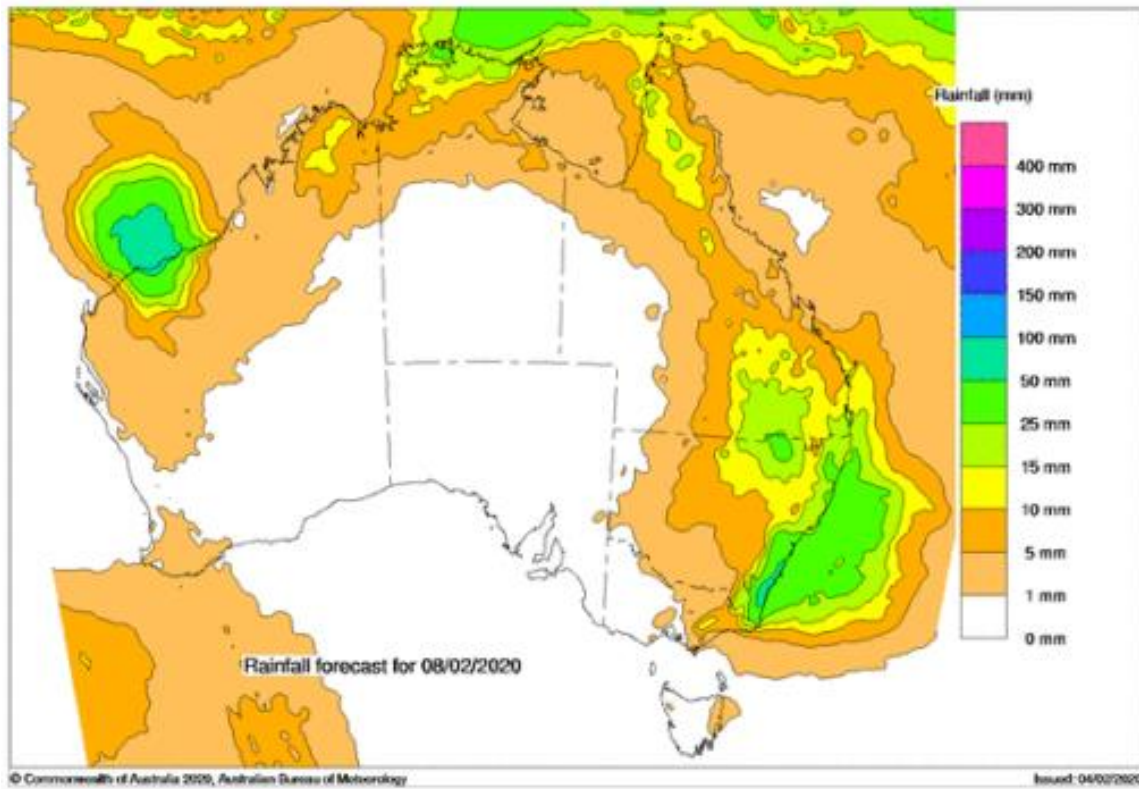
Wednesday 29 January



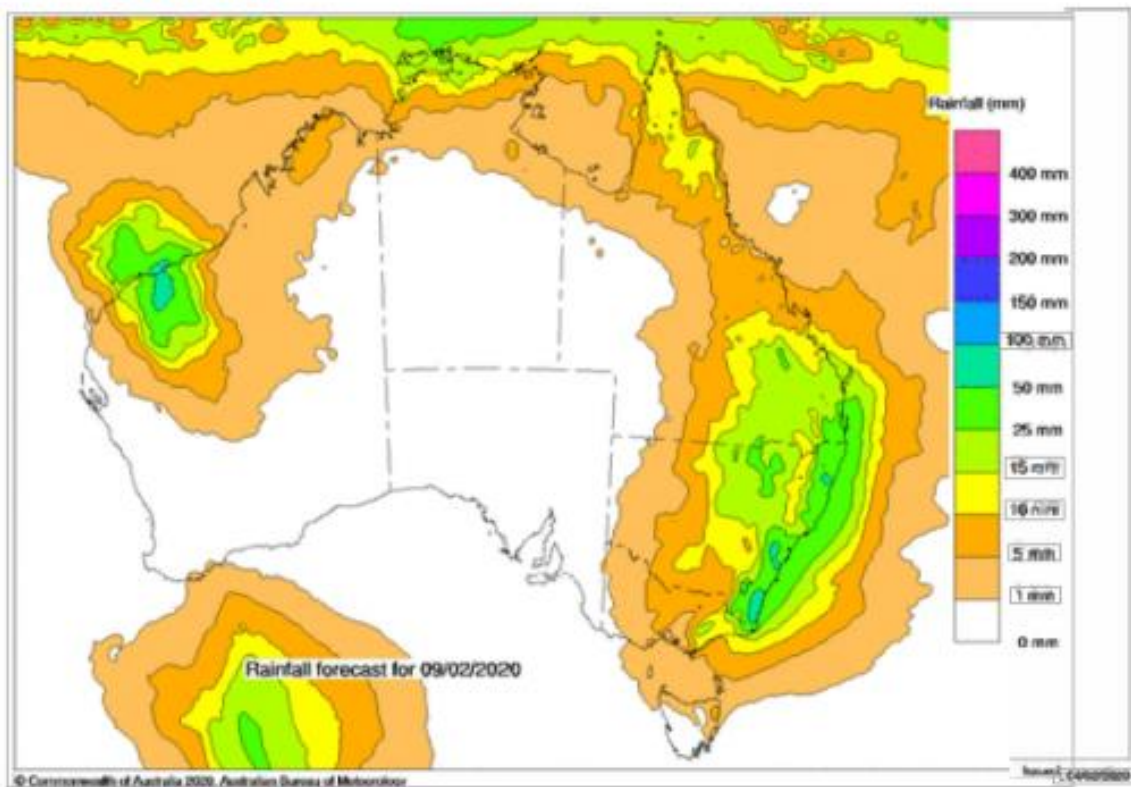
Friday 7 February



Saturday 8 February



Sunday 9 February



Appendix I – Chronology of decisions and communications

TIMELINE OF NORTHERN BASIN FIRST FLUSH MANAGEMENT DECISIONS					
LEGEND	Context only	Restriction	Temporary lift	Permanent lift	Communications

No	Date	Decision	Public Supporting information
1.	Wed 26 June 2019	<i>Temporary Water Restriction (NSW Border Rivers) Order 2019</i> (pg 48-50) restricts the take of 50% of water in accounts as at 30 June 2019 from the Border Rivers Regulated River for holders of regulated river (general security) licences (A and B class). Expires 30 June 2020.	Reasons for decision published on DPIE website
2.	Wed 30 Oct 2019	<i>Temporary Water Restrictions (Lower Darling Regulated River Water Source) Amendment Order No. 2 2019</i> (pg 30-34) amends current restrictions in place to restrict the take of water from the Lower Darling Regulated River Water Source except for: <ul style="list-style-type: none"> town water supply, domestic use, stock watering irrigation of existing permanent plantings (e.g. vineyards, orchards) the purpose of testing metering equipment in accordance with licence conditions Expires 30 June 2020.	Reasons for decision published on DPIE website
3.	Fri 1 Nov 2019	<i>Temporary Water Restriction (Macquarie Bogan Unregulated Water Sources) Order 2019</i> limits permissible take to 20% of water credited on 1 July 2019 within the Macquarie Bogan Unregulated water sources from the following: <ul style="list-style-type: none"> Campbells River Water Source in the Campbells River Downstream Management Zone, Macquarie River above Burrendong Water Source in the Macquarie River above Bathurst Management Zone, Fish River Water Source from downstream of Lake Oberon to the confluence with Macquarie River. Water can still be taken for the purpose of testing metering equipment in accordance with licence conditions. Expires 30 June 2020.	Reasons for decision published on DPIE website
4.	Wed 4 Dec 2019	<i>Temporary Water Restriction (Upper and Lower Namoi Regulated River Water Sources) Amendment Order No. 2 2019</i> (pg 49-55) amends current restrictions to restrict general security licence holders taking water from the Upper and Lower Namoi Regulated River Water Sources (except for the purpose of testing metering equipment). Expires 30 June 2020.	Reasons for decision published on DPIE website
5.	Wed 8 Jan 2020	<i>Temporary Water Restriction (Bega and Brogo Regulated Rivers Water Source) Order 2020</i> restricts the take of water from the Bega and Brogo Regulated Rivers Water Source by: <ul style="list-style-type: none"> regulated river (general security) access licence holders, and 	Reasons for decision published on DPIE website

		<ul style="list-style-type: none"> any other licence holders in relation to water purchased water from those holders while the order was in force. <p>Water can still be taken for the purpose of testing metering equipment in accordance with licence conditions. Expires 30 June 2020.</p>	
6.	Fri 17 Jan 2020	<p><i>Temporary Water Restriction (Northern NSW Murray Darling Basin) Order 2020</i> prevents the take of water:</p> <ul style="list-style-type: none"> from the Barwon-Darling Unregulated River Water Source, by unregulated river (A-C class) licences by unregulated river and unregulated river (special additional high flow) licence holders (where relevant) from: <ul style="list-style-type: none"> Castlereagh River Unregulated River Water Sources Macquarie Bogan Unregulated Water Sources NSW Border Rivers Unregulated Water Sources Gwydir Unregulated River Water Sources Intersecting Streams Unregulated Water Sources Namoi Unregulated Rivers Water Sources Peel Unregulated River Water Sources by regulated river high security, general security (inc A and B class) from: <ul style="list-style-type: none"> Border Rivers Regulated River Water Source Gwydir Regulated River Water Source Lower Namoi Regulated River Water Source Upper Namoi Regulated River Water Source Peel Regulated River Water Source <p>Expires 31 January 2020. Note: this restriction was subsequently extended to 17 February 2020 (item 14), and then again to 28 February 2020 (item 41).</p>	<p>Reasons for decision published on DPIE website</p> <p>See also WNSW media release.</p> <p>Link on Twitter</p>
7.	Fri 17 Jan 2020	<p>WNSW provided an operations update regarding significant rainfall in the Bell and Little river catchments which will result in high flows downstream of Burrendong Dam.</p>	
8.	Mon 20 Jan 2020	<p>Lift of restrictions for unregulated river licence holders to take from the following water sources within the Macquarie Bogan unregulated water source area (20-31 January 2020):</p> <ul style="list-style-type: none"> Campbells River Water Source in the Campbells River Downstream Management Zone Macquarie River above Burrendong Water Source in the Macquarie River above Bathurst Management Zone Fish River Water Source from downstream of Lake Oberon to the confluence with Macquarie River <p>Relates to the restriction in item 3 which was due to expire 30 June 2020.</p>	<p>Reasons for approval section of the approval document, published on DPIE website</p>
9.	Mon 20 Jan 2020	<p>WNSW provided an operations update regarding the management of flows in Burrendong catchment under the tributary flow management plan.</p>	
10.	Wed 22 Jan 2020	<p>Nil – WNSW media release re 324 restriction lifted for users upstream of Bathurst</p>	<p>WNSW media release</p>

11.	Fri 24 Jan 2020	<p>Temporary lift of restrictions for unregulated licence holders to take from the Macquarie River between Bathurst and Evans Plains Creek (23-31 January).</p> <p>Relates to restriction in item 6 due to expire 31 January (but subsequently extended to 17 Feb (item 14) and again to 28 Feb 2020 (item 41).</p>	<p>Reasons for approval section of the approval document, published on DPIE website</p> <p>WNSW publishes Operations update</p>
12.	Sun 26 Jan 2020	<p>Temporary lift of restrictions to allow take (from 26 – 31 January 2020):</p> <ul style="list-style-type: none"> by unregulated licence holders from the Namoi unregulated water source in relation to the: <ul style="list-style-type: none"> Mooki River Quirindi Creek by regulated river (HS) licence holders from the Peel Regulated River Water Source. <p>Relates to restriction in item 6 due to expire 31 January (but subsequently extended to 17 Feb (item 14) and again to 28 Feb 2020 (item 41).</p>	<p>Reasons for approval section of the approval document, published on DPIE website</p> <p>WNSW media release</p>
13.	Tue 28 Jan 2020	<p>WNSW provided an operations update confirming that only one more block release of water to the Beribula River system is scheduled for summer 2020.</p>	
14.	Thu 30 Jan 2020	<p><i>Temporary Water Restriction (Northern NSW Murray Darling Basin) Amendment Order 2020</i> ends some restrictions (see next item) and extends duration of <i>Temporary Water Restriction (Northern NSW Murray Darling Basin) Order 2020</i> (see item 6) to 17 February 2020.</p>	<p>Reasons for decision published on DPIE website</p> <p>Link on Twitter</p>
15.	Thu 30 Jan 2020	<p><i>Temporary Water Restriction (Northern NSW Murray Darling Basin) Amendment Order 2020</i> ends the restriction on:</p> <ul style="list-style-type: none"> unregulated river licence holders taking water from the Macquarie River above Burrendong Water Source between Bathurst and Evans Plains Creek Management Zone unregulated river licence holders subject to the <i>Temporary Water Restriction (Macquarie Bogan Unregulated Water Sources) Order 2019</i> (see item 3). <p>Note: this means that restriction operates to its full extent.</p>	<p>Reasons for decision published on DPIE website</p>
16.	Fri 31 Jan 2020	<p>WNSW provided an operations update on significant rainfall in the Namoi river catchment area.</p>	
17.	Fri 31 Jan 2020	<p>Temporary lift of restrictions to allow take of water:</p> <ul style="list-style-type: none"> by unregulated licence holders from the Namoi unregulated water source (from 26 January - 7 February) in relation to: <ul style="list-style-type: none"> Mooki River Quirindi Creek by regulated (HS) licence holders from the Peel Regulated River Water Source (from 31 January – 7 February) <p>Substantially extends the lift in item 12 following extension of the restriction in item 6 from 31 Jan to 17 Feb 2020 (see item</p>	<p>Reasons for approval section of the approval document, published on DPIE website</p> <p>WNSW issues media release</p>

		14). The restriction was later extended again to 28 February 2020 (item 41).	
18.	Tue 4 Feb 2020	WNSW provided an operations update confirming that NSW DPIE had not approved access to uncontrolled flows in the Beribula River but had approved access to Supplementary Flow in Belubula from 4 February until 7 February.	
19.	Fri 7 Feb 2020	<p><i>Temporary Water Restriction (Northern Basin) (Floodplain Harvesting) Order 2020</i> restricts FPH (except for BLR and passive take) from the:</p> <ul style="list-style-type: none"> • Barwon-Darling Valley floodplain • Gwydir Valley Floodplain • Lower Namoi Valley Floodplain • Narrabri – Wee Waa Floodplain • Narromine to Oxley Station Floodplain • Upper Namoi Valley Floodplain <p>Expires 28 February 2020.</p>	<p>Reasons for decision published on DPIE website</p> <p>See also WNSW media release</p> <p>Separately, WNSW issues media release on Sydney dams and ALDP amendment re stock water trade</p> <p>Link on Twitter</p>
20.	Fri 7 Feb 2020	WNSW provided an operations update reminding High Security Licence holders accessing water from the Peel River of the current Temporary Water restrictions.	
21.	Sat 8 Feb 2020	<p>Lift of restrictions on unregulated licence holders taking water from the Namoi unregulated water source (8 until 17 February) in relation to:</p> <ul style="list-style-type: none"> • 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 • Spring and Bobbiwaa Creeks Water Source • Mooki River Water Source • Quirindi Creek Water Source • Warrah Creek Water Source <p>Relates to restriction in item 6 as extended by item 15 to 17 February 2020 (and subsequently extended again to 28 February 2020 by item 38).</p>	Reasons for approval section of the approval document , published on DPIE website
22.	Sat 8 Feb 2020	<p>Lift of restrictions on unregulated licence holders taking water from the Gwydir unregulated water source (8 until 17 February) in relation to:</p> <ul style="list-style-type: none"> • Thalaba Creek • Millie Creek <p>Relates to restriction in item 6 as extended by item 15 to 17 February 2020 (and subsequently extended again to 28 February 2020 by item 38).</p>	Reasons for approval section of the approval document , published on DPIE website

23.	Sun 9 Feb 2020	Lift of restrictions on unregulated licence holders taking water from the Gwydir unregulated water source (9 – 12 February) in relation to the Mehi unregulated river water source. Relates to restriction in item 6 as extended by item 15 to 17 February 2020 (and subsequently extended again to 28 February 2020 by item 38).	Reasons for approval section of the approval document , published on DPIE website
24.	Sun 9 Feb 2020	Lift of restrictions to permit take by regulated river (high security) licence holders from: <ul style="list-style-type: none"> • Namoi water source • Upper Namoi water source • Peel water source Relates to restriction in item 6 as extended by item 15 to 17 February 2020. When the restriction was extended again to 28 February by item 38, it excluded these licences from the continued restrictions.	Reasons for approval section of the approval document , published on DPIE website
25.	Sun 9 Feb 2020	Lift of restrictions on unregulated licence holders taking water from the Namoi unregulated water source (from 9– 17 February 2020) in relation to the following: <ul style="list-style-type: none"> • Brigalow water source • Bundock water source • Coghill water source • Etoo and Talluba water source • Lower Namoi water source • Baradine water source. Relates to restriction in item 6 as extended by item 15 to 17 February 2020 (and subsequently extended again to 28 February 2020 by item 38).	Reasons for approval section of the approval document , published on DPIE website
26.	Sun 9 Feb 2020	Lift of restrictions to take water pursuant to FPH (9 – 12 Feb) from the Gwydir Valley Floodplain within the Mehi River and Thalaba Creek water sources specified in the Gwydir unregulated WSP. Relates to restriction in item 21 expiring on 28 February 2020.	Reasons for approval section of the approval document , published on DPIE website
27.	Mon 10 Feb	Nil - WNSW provided an operations update regarding rainfall and forecasted flows in the Barwon-Darling system.	
28.	Mon 10 Feb 2020	Lift of restrictions to take water pursuant to FPH (10 – 13 Feb) from the: <ul style="list-style-type: none"> • Barwon- Darling Floodplain within the Mehi River, Barwon, and Thalaba Creek water sources (as specified in the Gwydir unregulated WSP) and Pian Creek and Barandine Creek water sources (as specified in the Namoi unregulated WSP) • Lower Namoi Valley Floodplain within the Pian Creek and Barandine Creek water sources specified in the Namoi unregulated WSP • Gwydir Valley Floodplain within the Mehi River, Barwon, and Thalaba Creek water sources specified in the Gwydir unregulated WSP Relates to restriction in item 21 expiring on 28 February 2020.	Reasons for approval section of the approval document , published on DPIE website See also WNSW media release . See also WNSW operations update .
29.	Tues 11 Feb 2020	Nil – but WNSW media release re 324 Orders on Floodplain harvesting in the Northern Basin	WNSW media release

30.	Wed 12 Feb 2020	Nil - WNSW provided an operations update on rainfall and flow forecasts for the Barwon-Darling river system.	
	Wed 12 Feb 2020	Nil - WNSW provided an operations update on recent rainfall affecting the Macquarie - Tributary Flow Management Plan.	
32.	Wed 12 Feb 2020	Lift of restrictions for unregulated licence holders to take water from the Namoi unregulated water source (from 12– 17 Feb) in relation to the Yarraman Creek with the Lake Goran water source. Relates to restriction in item 6 as extended by item 15 to 17 February 2020 (and subsequently extended again to 28 February 2020 by item 38).	Reasons for approval section of the approval document , published on DPIE website See also WNSW media release WNSW Early warning network 10.45AM
33.	Wed 12 Feb 2020	<i>Temporary Water Restriction (Northern Basin) (Floodplain Harvesting) Amendment Order 2020</i> (pg 4-9) extends FPH restriction (except for BLR and passive take, see item 21) to additional floodplains: <ul style="list-style-type: none"> • Lower Macintyre River, Whalan Creek, & Boomi River Floodplain (from Yelarbon Crossing to Barwon – Boomi Rivers confluence) • Lower Macquarie Valley Floodplain Expires 28 February 2020.	Reasons for decision published on DPIE website See also WNSW media release Link on Twitter
34.	Wed 12 Feb 2020	<i>Temporary Water Restriction (Bega and Brogo Regulated Rivers Water Source) Repeal Order 2020</i> (pg 1-3) repeals the <i>Temporary Water Restriction (Bega and Brogo Regulated Rivers Water Source) Order 2020</i> (see item 5)	Reasons for decision published on DPIE website See also WNSW media release .
35.	Thu 13 Feb 2020	DPIE issues Fact Sheet on Temporary water restrictions on river and overland flows in the northern Basin	See also WNSW media release directing stakeholders to the fact sheet
36.	Fri 14 Feb 2020	WNSW provided an operations update advising landholders that the Lower Namoi Plan Replenishment is underway.	
37.	Fri 14 Feb 2020	WNSW provided an operations update on rainfall affecting the Barwon-Darling system and flows forecasted.	
38.	Fri 14 Feb 2020	<i>Temporary Water Restriction (Northern NSW Murray Darling Basin) Amendment (No 2) Order 2020</i> extends the duration of the restrictions in the <i>Temporary Water Restriction (Northern NSW Murray Darling Basin) Order 2020</i> (see item 6, initially extended by item 14 to 17 February 2020) to 28 February 2020. Continues to allow the take of water by regulated river (high security) licence holders to take water as approved in item 25 from: <ul style="list-style-type: none"> • Namoi water source • Upper Namoi water source • Peel water source. 	Reasons for decision published on DPIE website See also WNSW media release Link on Twitter

39.	Mon 17 Feb 2020	Nil - WNSW provided summaries of the current forecast estimates of flow along the Barwon-Darling system in an operations update .	
40.	Mon 17 Feb 2020	Lift of restrictions on regulated river (high security) licence holders taking water from the Border rivers regulated water source (17– 28 Feb). Relates to restriction in item 6 as extended to 17 February 2020 (item 15) and then again to 28 February 2020 (item 38).	Reasons for approval section of the approval document , published on DPIE website
41.	Mon 17 Feb 2020	Lift of restrictions (item 6, extended by item 15 to 17 Feb) on unregulated licence holders from taking water from the Gwydir unregulated water source on 17 Feb in relation to the following water sources: <ul style="list-style-type: none"> • Thalaba Creek • Millie Creek 	Reasons for approval section of the approval document . Link from WNSW media release
42.	Mon 17 Feb 2020	Lift of restrictions (see item 6, extended by item 15 to 17 Feb) on unregulated licence holders from taking water from the Namoi unregulated water source on 17 Feb in relation to the following water sources: <ul style="list-style-type: none"> • 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 • Spring and Bobbiwaa Creeks Water Source • Mooki River Water Source • Quirindi Creek Water Source • Warrah Creek Water Source 	Reasons for approval section of the approval document , published on DPIE website Link from WNSW media release
43.	Mon 17 Feb 2020	Nil – but DPIE issued update on temporary water restrictions on river and overland flows in the northern Basin and a statement on Storms in the Namoi 17 February – maintaining the embargo on pumping	
44.	Tue 18 Feb 2020	Lift of restrictions for unregulated licence holders to take water from the Namoi unregulated water source (from 18 February) in relation to the Yarraman Creek with the Lake Goran water source. Substantially extends the lift in item 12 following the second extension of the restriction in item 6 from 17 February to 28 February 2020 (by item 41).	Reasons for approval section of the approval document , published on DPIE website
45.	Tues 18 Feb 2020	WNSW provided an operations update advising landholders that the replenishment flow for the unregulated Pian Creek that commenced 9 February 2020 had ceased earlier than planned.	
46.	Wed 19 Feb 2020	WNSW provided an operations update advising that the flows in the Peel River and Upper Namoi are only able to be extracted by High Security licences or for Stock and Domestic purposes.	

47.	Wed 19 Feb 2020	Nil - WNSW provided an operations update on rainfall affecting the Barwon-Darling system and flows forecasted.	
48.	Wed 19 Feb 2020	WNSW provided an operations update advising landholders that the replenishment flow for the unregulated Pian Creek had recommenced.	
49.	Wed 19 Feb 2020	WNSW provided an operations update advising that High Security Licence holders accessing water from the NSW Border Rivers were able to access water in their high security accounts.	
50.	Wed 19 Feb 2020	Nil - Maps of floodplains uploaded to DPIE website and WNSW issued a media release regarding inflows into Central West dams. See also outcomes of Barwon-Darling/Lower Darling Critical Water Advisory Panel	
51.	Fri 21 Feb 2020	<p>Lift of restrictions on unregulated licence holders taking water from all unregulated water sources (21-28 February) in the:</p> <ul style="list-style-type: none"> • Water Sharing Plan for the NSW Border Rivers Unregulated and Alluvial Water Sources 2012 • Water Sharing Plan for the Gwydir Unregulated and Alluvial Water Sources 2012 • Water Sharing Plan for the Namoi Unregulated and Alluvial Water Sources 2012 • Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012 • Water Sharing Plan for the Peel Valley Regulated, Unregulated, Alluvium and Fractured Rock Water Sources 2010 • Water Sharing Plan for the Castlereagh River Unregulated and Alluvial Water Sources 2011 <p>Relates to restriction in item 6 as extended to 17 February 2020 (item 15) and then again to 28 February 2020 (item 41).</p>	<p>Reasons for approval section of the approval document, published on DPIE website</p> <p>See also DPIE media release.</p>
52.	Fri 21 Feb 2020	<p>Lift of FPH restrictions (21-28 February) on:</p> <ul style="list-style-type: none"> • Gwydir Valley Floodplain • Narromine to Oxley Station Floodplain • Upper Namoi Valley Floodplain • Lower Macquarie Valley Floodplain <p>Relates to restriction in item 21, as extended to 28 February 2020 (item 38).</p>	<p>Reasons for approval section of the approval document, published on DPIE website</p> <p>See also DPIE media release and WNSW media release re BD flows</p>
53.	Fri 21 Feb 2020	Nil - WNSW provided an operations update on rainfall and flow forecasts for the Barwon-Darling river system.	
54.	Sun 23 Feb 2020	<p>Lift of FPH restrictions (23-28 February) on:</p> <ul style="list-style-type: none"> • Lower Namoi Valley Floodplain • Narrabri – Wee Waa Floodplain • Lower Macintyre River, Whalan Creek & Boomi River Floodplain <p>Relates to restriction in item 15, as extended to 28 February 2020 (item 38).</p>	Reasons for approval section of the approval document , published on DPIE website

55.	Sun 23 Feb 2020	Lift of restrictions on general security regulated river licence holders taking water from the NSW Border Rivers Regulated Water Sources (23-28 February). Relates to restriction in item 6 as extended to 17 February 2020 (item 15) and then again to 28 February 2020 (item 41).	Reasons for approval section of the approval document , published on DPIE website
56.	Mon 24 Feb 2020	Nil – but DPIE issues update on temporary water restrictions on river and overland flows in the northern Basin	
57.	Mon 24 Feb 2020	Nil - WNSW provided an operations update on rainfall and flow forecasts for the Barwon-Darling river system.	
58.	Tue 25 Feb 2020	<i>Temporary Water Restriction (Upper and Lower Namoi Regulated River Water Sources and NSW Border Rivers) Repeal Order 2020</i> repeals restrictions to permit general security regulated licence holders to take water from: <ul style="list-style-type: none"> • Border Rivers regulated river water sources (item 1) • Upper and Lower Namoi regulated water sources (item 4) 	Reasons for decision published on DPIE website WNSW media release WNSW operations update
59.	Wed 26 Feb 2020	Nil - WNSW provided an operations update on rainfall and flow forecasts for the Barwon-Darling river system.	
60.	Thu 27 Feb 2020	Nil -WNSW provided an operations update advising that river levels in the Murrumbidgee are forecast to remain low for the rest of the season.	
61.	Thu 27 Feb 2020	Lifts restrictions on unregulated river licence holders (A-C class) taking water from Barwon-Darling Upstream of the Culgoa Junction (Management Zones 1 to 9) (27-28 February 2020). Relates to restriction in item 6 as extended to 17 February 2020 (item 15) and then again to 28 February 2020 (item 41).	Reasons for approval section of the approval document , published on DPIE website
62.	Fri 28 Feb 2020	Nil - WNSW provided an operations update on rainfall and flow forecasts for the Barwon-Darling river system.	
63.	Fri 28 Feb 2020	Restrictions expire (see items 21 and 41) but new Barwon-Darling order made effective the following day (see next).	DPIE media release
64.	Sat 29 Feb 2020	<i>Temporary Water Restriction (Barwon-Darling) Order 2020</i> restricts access to unregulated access licence holders (A – C class) in <ul style="list-style-type: none"> • Culgoa River Junction to Bourke Management Zone • Bourke to Louth Management Zone • Louth to Tilpa Management Zone • Tilpa to Wilcannia Management Zone • Wilcannia to Upstream Lake Wetherell Management Zone Also restricts FPH from the Barwon-Darling Valley floodplain (except for BLR and passive take). Expires 17 April 2020.	Reasons for decision published on DPIE website WNSW media release Link on Twitter
65.	Mon 2 Mar 2020	Nil - but WNSW issues media release stating quarter of NSW still in 'intense drought'	

66.	Mon 2 Mar 2020	Nil - WNSW provided an operations update on rainfall and flow forecasts for the Barwon-Darling river system.	
67.	Wed 4 Mar 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
68.	Thu 5 Mar 2020	Nil – but DPIE issues update on Temporary water restrictions on river and overland flows in the Barwon-Darling	
69.	Thu 5 Mar 2020	Nil - WNSW provides an operations update requesting expressions of interest for Supplementary Access to Lower Namoi systems.	
70.	Thu 6 Mar 2020	Nil - WNSW provides an operations update on rainfall and flows for the Barwon-Darling river system.	
71.	Fri 6 Mar 2020	Lift of restriction on unregulated access licence holders (A – C class) taking water downstream of the Culgoa Junction Barwon-Darling Unregulated River Water Source (Management Zones 10 to 14) (6 March – 17 April 2020). Relates to restriction in item 64 which expires 17 April 2020.	Reasons for approval section of the approval document , published on DPIE website Link on Twitter
72.	Mon 9 Mar 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
73.	Wed 11 Mar 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
74.	Thu 12 Mar 2020	Nil - but WNSW issues media release regarding water arriving in Menindee Lakes	
75.	Fri 13 Mar 2020	Nil - but see DPIE Barwon-Darling/Lower Darling Critical Water Advisory Critical Water Advisory Panel meeting communiqué	
76.	Fri 13 Mar 2020	WNSW provided an operations update advising that water release from Menindee Lakes system will commence 16 March 2020.	
77.	Fri 13 Mar 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
78.	Mon 16 Mar 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
79.	Tues 17 Mar 2020	Nil - but WNSW issues media release regarding Keepit Dam release	
80.	Wed 18 Mar 2020	WNSW provided an operations update advising that the water release from Menindee Lakes. The release was delayed after a fish kill occurred over the period Thursday 12 March to Saturday 14 March.	
81.	Wed 18	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	

	Mar 2020		
82.	Thu 19 Mar 2020	Nil - but DPIE issues Lower Darling releases 2020 fact sheet No. 1	
83.	Fri 20 Mar 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
84.	Fri 20 Mar 2020	Nil - but see DPIE Barwon-Darling/Lower Darling Critical Water Advisory Critical Water Advisory Panel meeting communique	
85.	Fri 20 Mar 2020	Nil - WNSW provided an operations update on releases from Menindee Lakes.	
86.	Mon 23 Mar 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
87.	Mon 23 Mar 2020	Nil - but see DPIE Combined Inland Critical Water Advisory Panels meeting communique	
88.	Tue 24 Mar 2020	Nil - WNSW provided an operations update on releases from Menindee Lakes.	
89.	Wed 25 Mar 2020	Nil - WNSW provided an operations update advising that flows through the Wallamundry Creek system of the Lachlan River will be lower.	
90.	Wed 25 Mar 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
91.	Thu 26 Mar 2020	Nil - WNSW provided an operations update on releases from the Menindee Lakes.	
92.	Thu 26 Mar 2020	Nil - but DPIE issues Lower Darling releases 2020 fact sheet No. 2	
93.	Fri 27 Mar 2020	WNSW provided an operations update advising that releases from Split Rock Dam in the Upper Namoi are recommenced 30 March 2020.	
94.	Fri 27 Mar 2020	Nil - but WNSW issues media release regarding Weir 32 releases into the Lower Darling. DPIE issues Lower Darling water quality update No. 1 . See also Barwon-Darling/Lower Darling Critical Water Advisory Critical Water Advisory Panel meeting communique	
95.	Fri 27 Mar 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
96.	Mon 30 Mar 2020	Temporary Water Restrictions (Lower Darling Regulated River Water Source) Repeal Order 2020 repeals the restriction on take of water from Lower Darling Regulated River Water Source in item 2.	Reasons for decision published on DPIE website See also DPIE media release

97.	Mon 30 Mar 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
98.	Tue 31 Mar 2020	Lift of restriction on FPH on Barwon-Darling Valley floodplain (31 March – 17 April 2020). Relates to restriction in item 64 which expires 17 April 2020.	Reasons for approval section of the approval document , published on DPIE website
99.	Tue 31 Mar 2020	Nil - WNSW provided an operations update advising that due to the continued drought conditions in the Lachlan catchment, water delivery operations in the regulated Willandra Creek will continue to be ceased.	
100.	Wed 1 Apr 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
101.	Thu 2 Apr 2020	WNSW provided an operations update advising that flows in Booberoi Creek in the Lachlan catchment were ceased on 1 April 2020.	
102.	Fri 3 Apr 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
103.	Fri 3 April 2020	Nil - but see DPIE Barwon-Darling/Lower Darling Critical Water Advisory Panel meeting communique	
104.	Sat 4 Apr 2020	WNSW provided an operations update advising that NSW DPIE had approved access to uncontrolled flows in the Belubula River from 4 April 2020 until 6 April 2020.	
105.	Sun 5 Apr 2020	WNSW provided an operations update advising that access to uncontrolled flows in the Belubula River (see above) had been extended to 8 April 2020.	
106.	Mon 6 Apr 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
107.	Mon 6 April 2020	Nil - but DPIE issues Lower Darling releases 2020 fact sheet No. 3 and water quality update No. 2	
108.	Tue 7 Apr 2020	Nil - WNSW provided an operations update on releases from the Menindee Lakes.	
109.	Tue 7 Apr 2020	WNSW provided an operations update advising that access to uncontrolled flows in the Belubula River had been extended to 10 April 2020	
110.	Wed 8 Apr 2020	Nil - WNSW provided an operations update advising of forecasted low river levels in the Murray-Edward river system.	
111.	Thu 9 Apr 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
112.	Thu 9 April 2020	Nil - but DPIE issues Lower Darling releases 2020 fact sheet No. 4 and water quality update No. 3 . See also Barwon-Darling/Lower Darling Critical Water Advisory Panel meeting communique	
113.	Sat 11 Apr 2020	Nil - WNSW provided an operations update advising of changes to Trade Application Processing.	

114.	Tue 14 Apr 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
115.	Fri 17 Apr 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
116.	Fri 17 Apr 2020	Nil - WNSW provided an operations update on releases from the Menindee Lakes.	
117.	Fri 17 April 2020	Nil - but DPIE issues Lower Darling releases 2020 fact sheet No. 5 and water quality update No. 4 . See also Barwon-Darling/Lower Darling Critical Water Advisory Panel meeting communique	
118.	Mon 20 Apr 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
119.	Wed 22 Apr 2020	Nil - WNSW provided an operations update advising that low levels were expected in the Edward-Wakool river system.	
120.	Wed 22 Apr 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
121.	Fri 24 April 2020	Nil - but DPIE issues Lower Darling water quality update No.5 . See also Barwon-Darling/Lower Darling Critical Water Advisory Panel meeting communique	
122.	Mon 27 Apr 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
123.	Tue 28 Apr 2020	Nil - WNSW provided an operations update on releases from the Menindee Lakes.	
124	Thu 30 Apr 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
125.	Mon 4 May 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
126.	Thu 7 May 2020	Nil - WNSW provided an operations update advising that flows in the Murrumbidgee River below Gogeldrie Weir would increase in the coming days due to a system failure at Gogeldrie weir.	
127.	Thu 7 May 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
128.	Mon 11 May 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
129.	Thu 14 May 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
130.	Mon 18 May 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	

131.	Thu 21 May 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
132.	Mon 25 May 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
133.	Wed 27 May 2020	Nil - WNSW provided an operations update advising of critical maintenance works to reduce flows in the Lachlan River system.	
134.	Thu 28 May 2020	Nil - WNSW provided an operations update on rainfall and flows for the Barwon-Darling river system.	
135.	Wed 3 Jun 2020	Nil - WNSW provided an operations update on water orders for Hunter Valley regulated rivers operations.	
136.	Thu 4 Jun 2020	WNSW provided an operations update announcing the planned commencement of an Environmental Flow Event in the Hunter River on 5 June 2020.	
137.	Wed 10 Jun 2020	WNSW provided an operations update advising the Stevens Weir pool level will vary between the current level of 4.5m and 3.9m during winter.	
138.	Fri 12 Jun 2020	Nil - WNSW provided an operations update on releases from the Menindee Lakes.	

Appendix J – NRAR Observation Flight Report

SUBJECT: INTERIM REPORT:
Floodplain Harvesting Observation Flight

DATE: 11 February 2020

TO: [REDACTED]
[REDACTED]
[REDACTED]

FROM: [REDACTED]

FLIGHT PATH:

From Tamworth to Boggabri, Narrabri, North West along Galathera Creek towards Bullarah. Then followed Thalaba Creek to property “Eiffley” owned by Ken Harris, then North West to the Mihi and back along Mallowa Creek. From there, around Collie Farm to Collarenebri, along Darling River past “Callinan” then on to Walgett.

From Walgett to Pilliga to Wee Waa to see main areas of flooding. Final trip from Narrabri to Tamworth.

OBSERVATIONS:

There was surprising little infrastructure damage with the amount of flood water across the flood plains/country. It appears most properties managed the volume of water in this recent rainfall/flood event. Small breaks in channels were viewed which would be expected in a flood event of this volume. No significant infrastructure damage was identified.

Taroo/Collymongle Farms: A channel blow out was observed on their main supply channel across a major floodway. More investigation is required to determine whether the channel is licensed to be above ground. Photo 3587

Callinan: No infrastructure damage was observed, there was a lot of flood water across the property. Water is ponded on some fields and upstream areas. The lagoon at the bottom of the property is full in capacity. It appears the ponded water is held up ready to be diverted by gravity into storage. Photo 3632

Areas of extensive flooding after falls of over 100mm in a number of places and reported falls of up to 300mm by Collie Farms. The areas with the most water included Galathera Creek in Spring Plains down to Thalaba Creek. There was a lot of water around Mallowa Creek and the Mehi Floodplain between Kurraboona and Bronte.

A further report covering potential floodplain harvesting activity will be developed and forwarded with a collection of photos.