

Australian Government

Commonwealth Environmental Water Office

Integrated planning for the use, carryover and trade of Commonwealth environmental water

Namoi River Valley

2015–16



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Acknowledgement of the traditional owners of the Murray-Darling Basin

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Commonwealth environmental water portfolio management planning

Purpose of the document

This document consists of two parts. Part I sets out the Commonwealth Environmental Water Office's (the Office) portfolio management planning for 2015–16 and for the following two years. Part II of this document establishes the context for how the Office integrates its management of the Commonwealth environmental water portfolio in the Namoi River Valley and across the Murray-Darling Basin more broadly. It sets out the environmental demands that Commonwealth environmental water may contribute to in the Namoi River Valley, as well as the long-term supply profile for Commonwealth environmental water. Part II also explains how these two factors are considered together to inform an overall purpose for portfolio management, as well as the most appropriate mix of portfolio management options to maximise the benefits that can be achieved with the water portfolio across multiple years.

Purpose of portfolio management planning

Efficient and effective management of the Commonwealth environmental water holdings requires the utilisation of all portfolio management options (use, carryover and trade). To support improved outcomes from water use over time, carryover provides the opportunity to optimise water use across water years and to improve water availability early in a water year, while trade provides further capacity to optimise use over the long-term as well as across catchments.

Through multi-year integrated planning, portfolio management tools such as use, carryover and trade can be strategically managed for maximising environmental outcomes. Integrated portfolio management planning will also support the Office in:

- meeting Basin Plan obligations and contributing to the long-term objectives of the environmental watering plan, the expected outcomes in the Basin-wide environmental watering strategy and Basin annual environmental watering priorities
- managing the Commonwealth environmental water portfolio in response to the demands identified by Basin States in long-term environmental watering plans, once available
- applying adaptive management (including the setting of objectives, evaluating outcomes and informing future decision-making)
- providing increased transparency in relation to the Commonwealth Environmental Water Holder's portfolio management (use, trade and carryover) behaviour
- coordinating water use with delivery partners, including developing long-term delivery arrangements.

Scope of integrated portfolio management planning

The following portfolio management options have been determined to be in scope for integrated planning by the Office:

- Use
- carryover
- trade of allocations including:
 - o transfer of allocations between connected catchments
 - o sale of allocations
 - o purchase of allocations.

The Office's portfolio management planning seeks to consider long-term demands (i.e. flow regimes) and supply, covering at least the preceding three years and out to three years.

Part I: Portfolio management planning in the Namoi River Valley

1. Purpose and portfolio management for 2015–16

1.1. Overall purpose

Demand for environmental water

Generally hot and dry conditions have prevailed in the Namoi catchment since 2012–13, with below average to lowest on record rainfall since March 2012, and above average to very much above average maximum temperatures across the region. Dry conditions have led to decreasing storage levels, and a lack of appropriate triggers to deliver environmental water in either 2013–14 or 2014–15. As conditions continue to dry, water dependent species will require support to ensure their survival, and the river system will need watering to maintain resilience over the coming years.

Environmental water demands for environmental assets in the Namoi River Valley in 2015–16 are represented in Table 2 and summarised below:

Lower Namoi River channel: High demand. As a result of dry conditions in the catchment, target flows have not all been fully met over the past three years. Demands identified in the lower Namoi River are required between 1 in 1–2 years and 1 in 3 years. Consequently there is a high demand for water in 2015–16 to provide habitat, support native fish, and maintain connectivity within the river channel.

Wetlands/anabranches: Moderate demand. As a result of dry conditions in the catchment, target flows have not been fully met in the wetlands and anabranches of the lower Namoi system. Water is required to meet the demands identified 1 in 4–5 years, and may be required in the next 1–2 years to provide off channel habitat, and to support native fish and riparian vegetation in low commence to flow anabranches.

Peel River channel: High demand. Demands for baseflows and freshes in the Peel River have not been fully met in the past three years, resulting in a high demand for water. In particular, pulsed baseflows are required annually and are required in 2016–17. Water is required to provide habitat and opportunities for native fish, and to maintain water quality and connectivity.

<u>Supply</u>

Water resource availability (supply) in the context of meeting environmental demands is made up of allocations against entitlements held for the environment by the Commonwealth Environmental Water Holder, as well as natural and unregulated flows, and planned environmental water provisions. Further detail is provided in Part II, Section 4.

Considering carryover of Commonwealth environmental allocations from 2014–15 to 2015–16 and the range of potential opening allocations for 2015–16, along with the full range of potential stream flows, all resource availability scenarios from very low to high are in scope for 2015–16 (with moderate to high resource availability only possible if conditions become wet).

This resource availability scenario takes into account the significant storage deficit in the Lower Namoi that is required be made up to meet essential needs prior to any new allocation announcements being made. As at 18 June 2015 this storage deficit was 73 gigalitres. Split Rock and Keepit dams were at 6 per cent and 5 per cent of capacity respectively. The last General Security water allocation announcement in the lower Namoi River was made in August 2013.

<u>Purpose</u>

Figure 1 shows how these two factors (demand and supply) are considered together. The overall 'purpose' for managing the Commonwealth's water portfolio in the Namoi River Valley for 2015–16 is to **avoid damage** and **protect** assets in the lower Namoi River channel, wetlands and anabranches, and the Peel

River to ensure ecological capacity for recovery. If water availability becomes high to very high, there may be scope to **improve** the health and resilience of aquatic ecosystems in the Namoi River Valley.

	_	Demand fo	r environmental wate	r	
Overall environmental water resource availability	Very High – water predominantly needed urgently	High – water predominantly needed this year	Moderate – water predominantly needed this year and/or next	Low – water predominantly not needed this year	Very low - water predominantly not needed this year and next
Verylow		T			
Low					
Moderate					
High					
Very high					

Avoid damage: Avoid damage to environmental assets

Protect: Ensure ecological capacity for recovery

Maintain: Maintain ecological health and resilience

Improve: Improve the health and resilience of aquatic ecosystems / Build future capacity to support ecological health and resilience

Figure 1: Determining a broad purpose for portfolio management in the Namoi River Valley for 2015–16. Note: grey lines represent potential range in demand and resource availability

1.2. Water Use

Consistent with the demands and purpose described above, the Office is considering supplying environmental water to the following watering actions for 2015–16. Table 1 summarises which of these actions are relevant to which resource availability scenarios in 2015–16, with further detail and rationale established in Table 2, including implications for future years based on assumed use behavior for 2015–16. Table 1 also identifies the 2015–16 Basin annual environmental watering priorities (published by the Murray-Darling Basin Authority) that the various watering actions may contribute to meeting.

 Table 1: Potential Commonwealth watering actions and applicable resource availability scenarios for the

 Namoi River Valley in 2015–16

Watering action	2015–16 Basin annual environmental watering	Resource availability scenarios action is likely to be pursued under					
	priority(s) ¹	Low – very low	Moderate	High – very high			
Lower Namoi River (baseflows and freshes)	 Basin-wide flow variability and longitudinal connectivity Northern Basin fish refuges Silver perch 	Yes	Yes	Yes			
Wetlands / Anabranches	 Basin-wide in-stream and riparian vegetation Northern Basin fish refuges 	No	No	Yes			
Peel River channel (baseflows and freshes)	 Basin-wide flow variability and longitudinal connectivity 	Possible	Possible	Possible			

Lower Namoi River (baseflows and freshes)

<u>Summary</u>: Contributing to minimum and high/low season baseflows, and small to medium sized freshes in the lower Namoi River. Watering will provide refuge habitat, refresh and maintain pools, manage water quality, inundate low level structures, and provide hydrological connectivity and access for native fish. This may involve supplementing natural river flows or other water releases.

Timing: Year round

Operational considerations and feasibility:

- The substantial shortfall in storage levels in Keepit Dam may limit the availability of water and capacity to deliver environmental water in the lower Namoi River in 2015–16
- Providing baseflows in late winter to summer and contributing to spring/summer freshes may be most feasible/beneficial
- Consideration may be given to releasing environmental water from storage in response to periods of significant inflow into Keepit reservoir that are captured by the storage. This would be of greatest environmental value if releases were made to coincide with, or follow on from, periods of high end of system flows from the Peel River or other downstream tributaries

¹ For full details on the Basin annual environmental watering priorities refer to the MDBA website at http://www.mdba.gov.au/what-we-do/environmental-water/environmental-watering-priorities

- When contributing to freshes, consideration may be given to increasing peak flows in the river, providing a more natural recession rate, and/or contributing to end of system connectivity
- Where environmental water is used to supplement other flows, the preference is for those flows to be natural/unregulated, rather than regulated releases
- No variations from the standard operational considerations (see actions 1–4 in Part II, Section 3.6).

Wetlands / anabranches

<u>Summary</u>: Contributing flows to supplement natural unregulated freshes to connect the lower Namoi River with low commence to flow anabranches, provide off channel habitat, and support riparian vegetation.

Timing: Late spring/summer, and winter

Operational considerations and feasibility:

- The substantial shortfall in storage levels in Keepit Dam may limit the availability of water and capacity to deliver environmental water in anabranches and wetlands in the lower Namoi in 2015–16
- Environmental watering to target wetlands and anabranches would most likely only occur under a high or very high water resource availability scenario, which is only expected in 2015–16 if significant rainfall occurs
- No variations from the standard operational considerations (see action 5 in Part II, Section 3.6).

Peel River channel (baseflows and freshes)

<u>Summary</u>: Contributing to variable baseflows and freshes to the Peel River below Chaffey Dam, to inundate low level benches and point bars to enhance carbon and nutrient exchange, provide refuge habitat, maintain resilience, provide hydrological connectivity, and maintain riparian vegetation and water quality.

Timing: Year round

Operational considerations and feasibility:

- Delivery of environmental water in the Peel River system in 2015–16 would be dependent on receiving General Security allocations.
- Baseflows would most likely be delivered during or after a protracted period of low flows
- Freshes would be delivered in conjunction with other sources of water (natural and regulated)
- No variations from the standard operational considerations (see action 6–7 in Part II, Section 3.6).

Stakeholder feedback: Stakeholder feedback has recommended that if dry conditions continue protecting drought refuge habitat and deep holes will be important in 2015–16. Feedback will be sought on an ongoing basis as planning transitions to implementation phase (see Section 1.5).

1.3. Carryover

Commonwealth environmental water was not delivered in 2014–15, so all available allocations were carried over into 2015–16. A low proportion of the Commonwealth's available allocations for 2015–16 may be carried over to 2016–17 in the Namoi catchment, given the high environmental demands identified for 2015–16. However, if conditions preclude the release of Commonwealth environmental water from Keepit Dam (such as a blue-green algae outbreak in the reservoir or outlet capacity constraints), a high proportion of the available allocations may be carried over to 2016–17. The level of available allocations to be carried over to 2017–18 will depend upon resource availability and demand at the time.

1.4. Trade

At this time there is no plan to buy or sell allocations in the Namoi catchment in 2015–16. While supplementing supplies (through the purchase of regulated or supplementary allocation) may assist in meeting environmental demands, there is currently limited market opportunity for allocation purchase to be pursued. Additionally, if conditions remain dry, releases of general security water may not be made (as announced by Water NSW in April 2015), which would mean that the purchase of additional allocations is not a practical approach to meeting environmental demand. The moderate to high demands for environmental water that may extend to 2016–17 mean that the trade of allocations will be considered based on ongoing assessments of environmental demands within the Namoi catchment and across the Basin over the next two years (Table 2). The types of scenarios where the need to adjust the availability of Commonwealth allocations is most likely to arise in coming years include:

- If environmental demands have been met and it is determined that there is sufficient forecast allocation to meet future demands in the Namoi catchment, the market will be assessed to determine if there are opportunities to sell surplus water and secure proceeds to improve the Commonwealth Environmental Water Holder's capacity to meet current or future environmental demands across the Murray Darling Basin
- If a Basin-scale analysis identifies urgent environmental demands within a particular catchment and allocation purchase provides an opportunity to meet those demands using proceeds from the sale of water in a catchment with less urgent demands
- If conditions were to become wet while environmental demands remain high, market conditions might
 provide a favourable opportunity to purchase allocations to assist in meeting demands and
 augmenting natural flows

Refer to the <u>Commonwealth environmental water Trading Framework</u>, which includes operating rules, procedures, and <u>protocols</u>, for further information.

1.5. Your input

The management of Commonwealth environmental water relies on considerable advice and assistance from local organisations, state governments and others. Individuals and groups within the Murray-Darling Basin community are encouraged to submit suggestions for the management of Commonwealth environmental water. Please contact the Office via: ewater@environment.gov.au.

Table 2a: Environmental demands, potential watering in 2015–16 and outlook for coming years in the Namoi River Valley – VERY LOW / LOW WATER RESOURCE AVAILABILITY IN 2015–16

Environmental assets	Physical and	Indicative demand (for	Required	Watering histo	ory			2015–16		Implications fo	or future der	nands
	process assets	<u>all sources of water</u> in the system)	frequency (maximum dry	(from all source	ces of water) ⁴	1	Predominant urgency of	Purpose under verv low / low	Potential Commonwealth	Likely urgency of demand in 2016–17 if	2017–18 Bango	Met in 2016–17
			interval)	2012–13 (drving)	2013–14	2014–15	environmental demand for water	resource availability	environmental water contribution?	watering occurred as planned in 2015–16	of likely	Not met in
				(arying)	(Cry)	(Cry)		,		······	demana	2016–17
Lower Namoi River channel ¹	Drought refuge habitat Habitat maintenance Fish dispersal and resilience	Small flows (minimum flows and baseflows): 1 in 1–2 years Minimum flows met Min. Flows below target for much of May–June Min. Flows below targets for much of May–June Min. Flows below targets for much of May–June • 8 ML/day at Boggabri and 13 ML/day at Wee Waa 1 in 1–2 years Minimum flows met Min. Flows below targets much of Min. Flows below targets Min. Flows below targets Min. Flows below targets • 72 ML/day at Boggabri and 105 Met at Baseflows below Baseflows below Baseflows below targets Baseflows below targets Avoid damage have not been fully A high potential for wotoring in 2015 Moderate t		Moderate to High	Mode	erate to High						
	 Met at Boggabri and 260 ML/day at Wee Waa (July–Nov) 215 ML/day at Boggabri and 260 ML/day at Wee Waa (July–Nov) Met at Boggabri but less than target at Wee Waa for parts of July, Sept & Nov Met at Boggabri and 260 ML/day at Wee Waa (July–Nov) 		watering in 2015–16			High						
	Longitudinal connectivity Low level bank and bar wetting: Pool maintenance	 Medium flows: 500 ML/day at Bugilbone for 75 days (min. 25 consecutive days) preferably in 	1 in 2–3 years	Minimum 25 consecutive days not met	Not met	Not met	HIGH Demands have aenerally not been	Protect	Environmental water could contribute to meeting this demand for the minimum of 25	Moderate to High		Low
	Fish movement and access to habitat Fish spawning and recruitment	late spring/summer and late winter					fully met in the last three years.		days if delivered in conjunction with other water			High
	Fish spawning, recruitment, dispersal and condition (linked to nutrient cycling Increase ecosystem	Large flows: • 1 800 ML/day at Bugilbone for 60 days (min. 6 consecutive days) preferably in late spring/summer	1 in 3–5 years	1 800 ML/day flow met for min.6 consecutive days Min. target met in Nov-	1 800 ML/day flow not met Target met in October at Boggabri, but target not met at	Not met	HIGH Demands have generally not been	Protect	Insufficient water under a low water availability	Hiah		Low
	Bench and bank wetting: Access to habitat Nutrient cycling	 and late winter 1 400–2 870 ML/day at Boggabri and 1 500–3 150 ML/day at Wee Waa in Sept– Dec for min. 7 days 		Dec at Boggabri but target not met at Wee Waa	Wee Waa		fully met in the last three years.		to this demand.			High
Wetlands / Anabranches ²	Riparian vegetation in low commence to flow anabranch channels Fish movement and off channel habitat	Commence to fill wetlands preferably in late spring/summer and winter over 45 days (min. 7 consecutive days): • 4 000–4 500 MI /day	1 in 2–5 years (varies between native fish species)	Target at Bugilbone only met for min. 7 consecutive days (in winter)	Not met	Not met	MODERATE		Insufficient water under			Low
	recruitment	at Bugilbone Greater than 4 600 ML/day at Boggabri (for Barbers Lagoon) Greater than 3 300 ML/day at Duncan's gauge		not met			Demands have not been fully met in the past three years.	Protect	a low water availability scenario to contribute to this demand.	HIGH		High

Environmental assets	Physical and	Indicative demand (for	Required	Watering histo	ory			2015–16 Implications for future de			or future der	mands
	process assets	all sources of water in the system)	frequency (maximum dry	(from all sour	ces of water) ⁴	T	Predominant	Purpose under <u>very low</u> / <u>low</u> resource availability	Potential	Likely urgency of	2017–18	Met in 2016–17
			interval)	2012–13	2013–14	2014–15	environmental		environmental water	watering occurred as	Range of likely	
				(drying)	(dry)	(dry)	demand for water	availability	contribution?	planned in 2015–16	demand	Not met in 2016–17
Peel River channel ³	Habitat Water quality Fish resilience, movement, spawning and	 Baseflows: Minimum variable low baseflow greater than 3 ML/day) from Chaffey Dam 	Annually	Min, baseflows met Pulsed baseflow met for only 4	Min, baseflows met Pulsed baseflow not met	Min, baseflows met Pulsed baseflow not met	HIGH Higher pulsed baseflow	Protect	Environmental water could contribute to providing variability in	Moderate to Hiah	Мос	lerate-High
	recruitment Connectivity Wet low level- benches and point bars	 Pulsed baseflow (~500 ML/day) from Chaffey Dam 		days in July 2012			not been fully met over past three years.		baseflows releases if allocations become available in 2015–16			High
	Connectivity Water quality Fish spawning,	Fresh flow (1 000–4 000 ML/day) to provide connectivity and wet medium-level benches	2–3 years Average return interval	Flows greater than 1 000 ML/day over 3 days in July	Not met	Not met	HIGH Demand has not	Protect /	Insufficient water under a very low water availability scenario to	High		Low
	recruitment, movement and condition	point bars and riparian zone		2012			been fully met in recent years.	Maintain	contribute to this demand.	Ŭ		Critical
 Sourced from inform (Tony Townsend, pers. Sourced from inforr comm.) Sourced from Barma All watering history s 419021: Nama 419012: Nama 419059: Nama 419094: Nama 419045: Peel F 	nation provided by NSN comm.) nation provided by NS a Water Resources et a sourced from data from bi River at Bugilbone bi River at Boggabri bi River d/s Gunidgera bi River d/s Duncan's Ja River d/s Chaffey Dam	W DPI Fisheries (2011), MDB, SW DPI Fisheries (2011), MDI al. (2012), with advice from m the following gauges (Wo Weir unction	A (2012), and previ BA (2012) and Fost NSW DPI Fisheries (ater NSW 2015):	ous environmer er (1999), with Tony Townsend,	ntal watering, v advice from N: , pers. comm.)	with advice fron SW DPI Fisheries	n NSW DPI Fisheries (Tony Townsend, pers.	Carryover potential	Low proportion of lower Namoi allocations carried into 2016–17. NOTE: No carryover provisions in the Peel Valley.	Low to high proportion of allocations may be carried over to 2017– 18, but will depend upon resource availability and demands.	Level of c depend o demands availability	arryover will n environmental and resource y.
Key - events in previous means demo means demo means wate Note that not all dema	and was met, by Commony and was met, by Commony and was partially met, by C r did not contribute to me nds require water every ye	vealth environmental water or o commonwealth environmental w eting demands. ear, drying phases are important	iny other source vater or any other sour for floodplains and ter	ce (may be used t mporary wetlands	o indicate infrast or streams	ructure assisted de	elivery)	Trade potential	High need to augment supply, given recent dry conditions. Therefore should market conditions improve there is likely to be a desire to	Moderate to high expected need to augment supply, therefore should market conditions improve there is likely to be a desire to purchase allocation or	Potential t depend o demands availability	o trade will n environmental and resource y.
Key - potential watering means a hig means a sec means a low Key - urgency of enviro	n in 2015-16 h priority for Commonweal condary priority for Commo priority for Commonwealt nmental demands	th environmental watering (subj onwealth environmental waterin th environmental watering	iect to seasonal and c g, or a partial contribu			(general or supplementary) to assist in meeting high demands. Sale of allocations unlikely if demands remain high and low availability of water to meet them.	supplementary flow access to assist in meeting high demands. Sale of allocations unlikely considering a number of moderate and high demands expected.					

means critical demand i.e. urgent need for water in that particular year to manage risk of irretrievable loss or damage

means high demand for water i.e. needed in that particular year

means moderate demand for water i.e. water needed that particular year and/or next

means low demand for water i.e. water generally not needed that particular year

means very low demand for water i.e. water generally not needed that particular year or the following year

Note that demand is considered at a generalised scale; there may be specific requirements that are more or less urgent within the flow regime

Table 2b: Environmental demands, potential watering in 2015–16 and outlook for coming years in the Namoi River Valley - MODERATE WATER RESOURCE AVAILABILITY IN 2015–16

Environmental assets	Physical and	Indicative demand (for	Required	Watering history			2015–16		Implications for future demands		
	process assets	all sources of water in the system)	frequency (maximum dry	(from all sourc	ces of water) ⁴	1	Predominant urgency of	Purpose under moderate	Potential Commonwealth	Likely urgency of demand in 2016–17	2017–18 Met in 2016–17
			interval)	2012–13 (drying)	2013–14 (dry)	2014–15 (dry)	environmental demand for water	resource availability	environmental water contribution?	if watering occurred as planned in 2015– 16	likely demand Not met in 2016– 17
Lower Namoi River channel ¹	Drought refuge habitat Habitat maintenance Fish dispersal and resilience	 Small flows (minimum flows and baseflows): 8 ML/day at Boggabri and 13 ML/day at Wee Waa 72 ML/day at Boggabri and 105 ML/day at Wee Waa 	1 in 1–2 years	Minimum flows met Baseflows below targets much of March–June 2013 Met at Boggabri but	Min. Flows below target for much of May–June 2014 Baseflows below targets much of March– kupa 2014	Min. Flows below targets for much of July–Aug & Oct–Nov Baseflows below targets Feb–March 2015 and	HIGH / VERY HIGH Baseflow demands have not been fully met in last three	Protect	Contributing to medium sized flows would meet this demand	Moderate to High	Moderate to High
		 (Dec-June) 215 ML/day at Boggabri and 260 ML/day at Wee Waa (July-Nov) 		less than target at Wee Waa for parts of July, Sept & Nov	Aug at Boggabri and July–Oct at Wee Waa	VON-VIUC	years.				High
	Longitudinal connectivity Low level bank and bar wetting: Pool maintenance	Medium flows: • 500 ML/day at Bugilbone for 75 days (min. 25 consecutive days) preferably in	1 in 2–3 years	Minimum 25 consecutive days not met	Not met	Not met	HIGH Demands have generally not been	Protect	A high potential for watering in 2015–16,	Moderate	Low
	Fish movement and access to habitat Fish spawning and recruitment	late spring/summer and late winter					fully met in the last three years.		aepenaing on available water		High
	Fish spawning, recruitment, dispersal and condition (linked to nutrient cycling Increase ecosystem	Large flows: • 1 800 ML/day at Bugilbone for 60 days (min. 6 consecutive days) preferably in late spring/summer	1 in 3–5 years	1 800 ML/day flow met for min.6 consecutive days Min. target met in Nov-	1 800 ML/day flow not met Target met in October at Boggabri, but target not met at	Not met	HIGH Demands have generally not been	Protect	Environmental water may be able to contribute to meeting this demand, at least	Moderate to High	Low
	tunction Bench and bank wetting: Access to habitat Nutrient cycling	 and lafe winter 1 400–2 870 ML/day at Boggabri and 1 500–3 150 ML/day at Wee Waa in Sept– Dec for min. 7 days 		Dec at Boggabri but target not met at Wee Waa	Wee Waa		fully met in the last three years.		tor the minimum number of days, depending on available water		High
Wetlands / Anabranches ²	Riparian vegetation in low commence to flow anabranch channels Fish movement and off channel habitat	Commence to fill wetlands preferably in late spring/summer and winter over 45 days (min. 7 consecutive days):	1 in 2–5 years (varies between native fish species)	Target at Bugilbone only met for min. 7 consecutive days (in winter)	Not met	Not met	MODERATE		Insufficient water under		Low
	rish breeding and recruitment	 Greater than 4 600 ML/day at Boggabri (for Barbers Lagoon) Greater than 3 300 ML/day at Duncan's gauge 		not met			Demands have not been fully met in the past three years.	Maintain	to this demand.	HIGH	High

Environmental assets	s Physical and Indicative demand (for Required Watering history 2015–16				Implication	s for future demands					
	process assets	the system)	frequency (maximum dry	(from all source	ces of water) ⁴		Predominant urgency of	Purpose under moderate	Potential Commonwealth	Likely urgency of demand in 2016–17	2017–18 Met in 2016–17
			interval)	2012–13 (drying)	2013–14 (dry)	2014–15 (dry)	environmental demand for water	resource availability	environmental water contribution?	if watering occurred as planned in 2015– 16	likely demand Not met in 2016- 17
Peel River channel ³	Habitat Water quality Fish resilience, movement, spawning and recruitment	 Baseflows: Minimum variable low baseflow greater than 3 ML/day) from Chaffey Dam Pulsed baseflow (~500 ML/day) from 	Annually	Min, baseflows met Pulsed baseflow met for only 4 days in July 2012	Min, baseflows met Pulsed baseflow not met	Min, baseflows met Pulsed baseflow not met	HIGH Higher pulsed baseflow requirements have not been fully met	Protect	Environmental water could contribute to providing variability in baseflows releases if allocations become	Moderate to High	Moderate-High
	Wet low level- benches and point bars	Chaffey Dam					over past three years.		available in 2015–16		High
	Connectivity Water quality Fish spawning, recruitment, movement and condition	Fresh flow (1 000–4 000 ML/day) to provide connectivity and wet medium-level benches, point bars and riparian zone	2–3 years Average return interval	Flows greater than 1 000 ML/day over 3 days in July 2012	Not met	Not met	HIGH Demand has not	Maintain /	Insufficient water under a very low water availability scenario to	High	Low
							been fully met in recent years.	Improve	contribute to this demand.		Critical
See references at Tab	ble 2a							Carryover potential	Low to moderate proportion of allocations carried into 2016–17.	Low to moderate proportion of allocations may be carried over to 2017–18, but will	Level of carryover will depend on environmental demands and resource availability.
Key - events in previous y means demai means demai	years nd was met, by Commonwe nd was partially met, by Cor	alth environmental water or any mmonwealth environmental wate	other source er or any other source (may be used to inc	licate infrastructu	ure assisted deliver,	1)		NOTE: No carryover provisions in the Peel Valley.	depend upon resource availability and demands.	
Means water Note that not all deman Key - potential watering i means a high means a seco means a low p	did not contribute to meet ds require water every year in 2015-16 priority for Commonwealth ondary priority for Commony priority for Commonwealth	ing demands. r, drying phases are important for environmental watering (subject vealth environmental watering, o environmental watering	floodplains and tempo to seasonal and oper r a partial contributior	orary wetlands or st ational considerati 1 may be made	ions)			Trade potential	Moderate to high need to augment available allocations given recent dry conditions. Therefore should market conditions improve there is likely to be a desire to purchase allocation or supplementary flow	Moderate to high need to augment available allocations given recent dry conditions. Therefore should market conditions improve there is likely to be a desire to purchase	Potential to trade will depend on environmental demands and resource availability.
In the deside it of the de											

Table 2c: Environmental demands, potential watering in 2015–16 and outlook for coming years in the Namoi River Valley –HIGH WATER RESOURCE AVAILABILITY IN 2015–16

Environmental assets	Physical and	Indicative demand (for	Required	Watering histo	Watering history			2015–16		Implications for future demands		
	process assets	all sources of water in the system)	frequency (maximum dry	(from all sourc	ces of water) ⁴		Predominant	Purpose under	Potential	Likely urgency of	2017-18 Met in 2016-17	
			interval)	2012–13	2013–14	2014–15	urgency of environmental	nign / very nign resource	commonwealth environmental water	if watering occurred	Range of likely	
				(drying)	(dry)	(dry)	demand for water	availability	contribution?	as planned in 2015- 16	demand Not met in 2016– 17	
Lower Namoi River channel ¹	Drought refuge habitat Habitat maintenance Fish dispersal and resilience	 Small flows (minimum flows and baseflows): 8 ML/day at Boggabri and 13 ML/day at Wee Waa 72 ML/day at Boggabri and 105 ML/day at Wee Waa (Dec-June) 215 ML/day at Boggabri and 260 ML/day at Wee Waa (July-Nov) 	1 in 1–2 years	Minimum flows met Baseflows below targets much of March–June 2013 Met at Boggabri but less than target at Wee Waa for parts of July, Sept & Nov	Min. Flows below target for much of May–June 2014 Baseflows below targets much of March– June 2014, and July– Aug at Boggabri and July–Oct at Wee Waa	Min. Flows below targets for much of July–Aug & Oct–Nov Baseflows below targets Feb–March 2015 and July–Nov	HIGH Baseflow demands have not been fully met in last three years.	Improve	Contributing to large flows would meet this demand	Moderate to High	Moderate to High High	
	Longitudinal connectivity Low level bank and bar wetting: Pool maintenance Fish movement and	Medium flows: • 500 ML/day at Bugilbone for 75 days (min. 25 consecutive days) preferably in late spring/summer and late winter	1 in 2–3 years	Minimum 25 consecutive days not met	Not met	Not met	HIGH Demands have generally not been fully met in the last	Improve	Contributing to large flows would meet this demand	Moderate	Low	
	access to habitat Fish spawning and recruitment						niee years.				High	
	Fish spawning, recruitment, dispersal and condition (linked to nutrient cycling Increase ecosystem function	Large flows: • 1 800 ML/day at Bugilbone for 60 days (min. 6 consecutive days) preferably in late spring/summer and late winter	1 in 3–5 years	1 800 ML/day flow met for min.6 consecutive days Min. target met in Nov- Dec at	1 800 ML/day flow not met Target met in October at Boggabri, but target not met at Wee Waa	Not met	HIGH Demands have generally not been	Improve	A high potential for watering in 2015–16, depending on	Low	Low	
	Bench and bank wetting: Access to habitat Nutrient cycling	 1 400–2 870 ML/day at Boggabri and 1 500–3 150 ML/day at Wee Waa in Sept– Dec for min. 7 days 		Boggabri but target not met at Wee Waa			fully met in the last three years.		available water		High	
Wetlands / Anabranches ²	Riparian vegetation in low commence to flow anabranch channels Fish movement and off channel habitat	Commence to fill wetlands preferably in late spring/summer and winter over 45 days (min. 7 consecutive days):	1 in 2–5 years (varies between native fish species)	Target at Bugilbone only met for min. 7 consecutive days (in winter)	Not met	Not met	MODERATE		Environmental water may be able to contribute to meeting		Low	
	Fish breeding and recruitment	 4 000-4 500 ML/day at Bugilbone Greater than 4 600 ML/day at Boggabri (for Barbers Lagoon) Greater than 3 300 ML/day at Duncan's gauge 		Other targets not met			Demands have not been fully met in the past three years.	Improve	fhis demand, at least for the minimum number of days, depending on available water	Moderate to High	High	

Environmental assets	Physical and	Indicative demand (for	Required	Watering histo	ory			2015–16		Implication	s for future o	demands
	process assets	all sources of water in the system)	frequency (maximum dry	(from all sour	ces of water) ⁴		Predominant	Purpose under	Potential Commonwoalth	Likely urgency of	2017–18	Met in 2016–17
			interval)	2012–13	2013–14	2014–15	environmental	resource	environmental water	if watering occurred	Range of likely	
				(drying)	(dry)	(dry)	demand for water	availability	contribution?	as planned in 2015- 16	demand	Not met in 2016– 17
Peel River channel ³	Habitat Water quality Fish resilience, movement, spawning and	 Baseflows: Minimum variable low baseflow greater than 3 ML/day) from Chaffey Dam Bulead baseflow 	Annually	Min, baseflows met Pulsed baseflow met for only 4	Min, baseflows met Pulsed baseflow not met	Min, baseflows met Pulsed baseflow not met	HIGH Higher pulsed baseflow requirements have	Improve	Environmental water could contribute to providing variability in	Moderate to High	Мо	oderate-High
	Connectivity Wet low level- benches and point bars	 Poised basellow (~500 ML/day) from Chaffey Dam 		2012			not been fully met over past three years.		allocations become available in 2015–16			High
	Connectivity Water quality Fish spawning, recruitment,	Fresh flow (1 000–4 000 ML/day) to provide connectivity and wet medium-level benches,	2–3 years Average return interval	Flows greater than 1 000 ML/day over 3 days in July 2012	Not met	Not met	HIGH Demand has not been fully met in	Improve	Environmental water could contribute to providing a fresh flow if allocations become	Moderate to high		Low
	movement and condition	point bars and riparian zone					recent years.		available and there are other adequate flows in the system.			High
See references at Tab	ears	h environmental water or any othe	r source		_	-		Carryover potential	Due to small holdings, low to moderate proportion of allocations carried into 2016–17.	Low to moderate proportion of allocations may be carried over to 2017–18, but will depend upon	Level of co depend o demands availability	arryover will n environmental and resource /.
means demand means water d Note that not all demand	d was partially met, by Comm id not contribute to meeting s require water every year, d	nonwealth environmental water or demands. rying phases are important for flood	any other source (may b dplains and temporary w	be used to indicate vetlands or streams	infrastructure assis	ted delivery)			NOTE: No carryover provisions in the Peel Valley.	resource availability and demands.		
Key - potential watering in means a high p means a secon means a low pr	2015-16 riority for Commonwealth en idary priority for Commonwea riority for Commonwealth en	vironmental watering (subject to s alth environmental watering, or a p vironmental watering	easonal and operationo artial contribution may	al considerations) be made				Trade potential	Moderate to high need to augment supply, given recent dry conditions. Therefore should market conditions improve there is likely to be the desire to purchase	Moderate need to augment available allocations. Sale of allocations may be considered, although there is expected to still be some moderate to	Potential t depend o demands availability	o trade will n environmental and resource /.
Note that demand is cons	demand i.e. urgent need for mand for water i.e. needed in the demand for water i.e. wat nand for water i.e. water ger v demand for water i.e. wate idered at a generalised scal	water in that particular year to man a that particular year ter needed that particular year and erally not needed that particular y r generally not needed that particu e; there may be specifc requirement	nage risk of irretrievable d/or next rear ular year or the following nts that are more or less	e loss or damage g year urgent within the fl	low regime				allocation or supplementary flow access to assist in meeting high demands. Sale of allocations unlikely considering moderate and high demands.	high demands requiring water.		

Part II: Commonwealth environmental water portfolio management planning

2.Background

2.1. Commonwealth environmental water

The Commonwealth Environmental Water Holder is an independent statutory position established by the Water Act 2007 (the Water Act) to manage the Commonwealth environmental water holdings. The Commonwealth Environmental Water Holder leads and is supported by the Commonwealth Environmental Water Office (the Office), a division of the Australian Government Department of the Environment.

Under the Water Act, Commonwealth environmental water must be managed to protect or restore environmental assets, so as to give effect to relevant international agreements. The Water Act also requires that the Commonwealth Environmental Water Holder perform its functions and exercise its powers consistently with and in a manner that gives effect to the Basin Plan and that Commonwealth environmental water is managed in accordance with the Basin Plan's environmental watering plan.

2.2. The Namoi River Valley

The Namoi River Valley is located in north eastern New South Wales (NSW), extending westwards of Nundle to Walgett. Rainfall in the upper catchment drives valley flows, with water for regulated delivery throughout the valley being stored in Split Rock and Keepit dams. There are also a number of smaller regulating weirs downstream of Keepit Dam.

The Namoi River is the primary riverine asset and is a major tributary of the Barwon River. Major tributaries of the Namoi include Cox's Creek and the Mooki, Manilla and the Peel rivers, which join the Namoi River upstream of Boggabri. Flows are confined in-channel until the floodplain begins to broaden at Gunnedah. The Pian (an anabranch of the Namoi River), Narrabri, Baradine and Bohena creeks contribute flows downstream of Boggabri.

Environmental watering in the Namoi River is most likely to be delivered as baseflows or freshes, undertaken in conjunction with other flows in the system (e.g. a naturally occurring fresh flow, or consumptive water), or during prolonged low flow conditions.

In order to achieve lower Namoi in-channel fresh requirements regulated releases from Keepit Dam can be timed to coincide with unregulated inflows from the Mooki River and Cox's Creek. Benefits may also extend downstream to the Barwon-Darling. Consideration may also be given to augmenting modified river management practices that may be implemented by river operators in response to low inflows, such as block releases of consumptive water orders. Where possible, environmental water will be managed for the benefit multiple sites to maximise the efficiency and effectiveness of water delivery.

The Peel River contributes an average annual volume of approximately 280 000 megalitres (ML) into the Namoi system (Green et al. 2011) and as such constitutes the other key asset within the Namoi River Valley. Flows are regulated out of Chaffey Dam and flow into the Namoi River slightly downstream of Keepit Dam. Major tributaries into the Peel River are Goonoo Goonoo Creek, the Cockburn River and Dungowan Creek.

Held environmental water in the Peel River can be made available from Chaffey Dam in combination with downstream unregulated tributary inflows, or as a form of translucency release in response to storage inflows. Use of Commonwealth environmental water is not contingent on unregulated flows in the Peel River and can be delivered in conjunction with a stimulus flow managed by the NSW Office of Water under the planned environmental water provisions of Water Sharing Plan.



Figure 2: Map of the Namoi River Valley (Green et al. 2011).

3.Long-term environmental water demands in the Namoi River Valley

3.1. Basin-wide environmental watering strategy

The Murray-Darling Basin Authority has published the first Basin-wide environmental watering strategy (the Strategy, MDBA 2014). Building on Basin Plan's environmental objectives, the Strategy sets out the Authority's best assessment of the expected environmental outcomes over the next decade as a result of implementing the Basin Plan and associated water reforms. The Strategy focuses on four components: river flows and connectivity; vegetation; waterbirds; and native fish. The expected outcomes for each component are summarised below, with more specific quantified outcomes provided in <u>Attachment A</u>.

River flows and connectivity: Improve connections along rivers and between rivers and their floodplains

Vegetation: Maintain extent and improve the condition

Waterbirds: Maintain current species diversity, improve breeding success and numbers

Native Fish: Maintain current species diversity, extend distributions, improve breeding success and numbers

3.2. Long-term watering plans

State governments are developing long-term watering plans for each catchment in the Basin. These plans will identify:

- the priority environmental assets and ecosystem functions in the catchment
- the objectives and targets for these assets and functions
- their watering requirements.

In developing these plans, state governments will be consulting with environmental water holders and local communities.

Once developed, these plans will provide the key information on the long-term environmental water demands in the catchment and the Office's planning for the Namoi River Valley will be reviewed so that this information can be incorporated.

Prior to the development of long-term watering plans, the Office will continue draw on existing documentation on environmental water demands developed by state governments, local natural resource management agencies and the Murray-Darling Basin Authority.

Key documentation includes:

- Assessment of environmental water requirements for the proposed Basin Plan: Lower Namoi River (in-channel flows) (MDBA 2012)
- Environmental water delivery: Namoi River (Barma Water Resources et al. 2012)
- A range of scientific literature and on-ground knowledge (e.g. from NSW Department of Primary Industries Fisheries, and NSW Office of Environment and Heritage officers).

The below section represents the Office's summary of the long-term environmental water demands, based on these documents. The objectives and expected outcomes for water-dependent ecosystems will continue to be revised and refined in response to best available knowledge, including drawing on the results of environmental watering monitoring programmes.

3.3. Expected outcomes in the Namoi River Valley

The expected outcomes from environmental watering in the Namoi River Valley are described below in Table 3 and how these contribute to Basin-wide outcomes. These outcomes will be refined and/or revised once the long-term watering plan for the catchment has been developed.

Table 3: Summary of long-term expected outcomes from environmental watering in the NamoiRiver Valley

BASIN-WIDE OUTCOMES (Outcomes in red link to the Basin-wide Environmental Watering Strategy)	EXPECT	TED OUTCOMES FC	OR LOWER NAMOI ASSETS						
	IN-CHANNEL ASSETS OFF-CHANNEL ASSE								
ECOSYSTEMS	Lower Namoi River channel	Peel River channel	Lower Namoi anabranch & floodplain wetland system						
VEGETATION	Maintain riparian vegetation condi survival (extent)	Maintain the condition, growth and survival (extent) of native vegetation of the anabranch communities and wetland vegetation							
WATERBIRDS	Provide drought re breeding	Provide drought refuge for waterbirds and opportunities for waterbird breeding							
FISH	Support reproduc Support connecti and aquatic habi	tion and recruitme vity and movement tat for native fish	ent opportunities for native fish nt, and maintain in-channel refuge						
MACROINVERTEBRATES	Support recruitme	ent and maintain r	nacroinvertebrate diversity						
OTHER VERTEBRATES	Support opportun native aquatic sp	ities for the reproc ecies, including fr	duction and recruitment of other ogs and turtles						
CONNECTIVITY	Support longitudinal connectivity, including with the lower Namoi floodplain and Barwon-Darling system	Support longitudinal connectivity,Support longitudinal longitudinal longitudinal connectivitySupport longitudinal lateral between the river and floodplain and Barwon-DarlingSupport connectivityIndicate and the river floodplainSupport longitudinal connectivitySupport connectivity, particular lateral between the river and floodplain							
PROCESSES	Support key ecosystem functions within channel and on the floodplain, including the cycling of nutrients and wetting banks and benches								
WATER QUALITY	Maintain water qu	Jality within chanr	nels and pools						
RESILIENCE	Provide drought re	efuge habitat (pa	rticularly for fish)						

Information sourced from:

- Murray-Darling Basin Authority (2012)
- Murray-Darling Basin Authority (2014)
- Barma Water Resources et al. (2012)
- Commonwealth Environmental Water Office (2014)
- Commonwealth Environmental Water Office (2011)

3.4. Flows in scope for Commonwealth environmental watering

Not all environmental demands can and will be met through the use of held environmental water. Some demands are met by regulated water deliveries for consumptive purposes, while others are met by large unregulated/natural flows events or are beyond what can be delivered within operational constraints. Figure 3 shows the broad environmental demands that are in scope for the Office to focus on contributing to in the Namoi River Valley. Importantly, these are broad, indicative demands and individual watering events may contribute to particular opportunities, such as using infrastructure to deliver water to individual wetlands that would otherwise not be possible due to constraints. Also, there may be opportunities for Basin State governments to remove or modify constraints, which will improve the efficiency and/or effectiveness of environmental watering.



Figure 3: Scope of demands that environmental water may contribute to in the Namoi River Valley

The delivery of environmental water in the Namoi River Valley is currently constrained by the release capacities from storages, channel capacities, and system constraints.

Watering actions will be developed in consideration of the following constraints:

- Keepit Dam storage capacity of 425 510 ML and outlet capacity of 4 000 ML/day (Water NSW 2015)
- Chaffey Dam storage capacity of 65 830 ML and outlet capacity of 1 100 ML/day (Water NSW 2015)
- Minor flood level of 39 900 ML/day at Narrabri
- Minor flood level of 13 400 ML/day at Bugilbone (downstream of Duncan's Junction)

In the Namoi River, Commonwealth environmental water will be carefully coordinated with unregulated flow events to deliver freshes and appropriate flow recessions. In the instance of a low inflow scenario, Commonwealth environmental water may be used in conjunction with minimum releases to provide low flow variability and maintain water quality and drought refuge.

Commonwealth environmental water delivery may be coordinated with a NSW stimulus flow in the Peel River to deliver a fresh flow. Alternatively, unregulated tributary flows could be used to

piggy-back releases from Chaffey Dam. Under a low flow scenario, Commonwealth environmental water could provide low flow variability for baseflows delivered from Chaffey Dam as per the Peel valley Water Sharing Plan.

The lower Namoi entitlement has a maximum use in a single year of 125 per cent of entitlement (subject to the account balance) and 300 per cent of entitlement over three consecutive years. The Peel allocation cannot be carried over and unused water is forfeited.

Operational considerations such as delivery methods, opportunities, constraints and risks will differ depending on the inflow scenario and are summarised in Table 4. These considerations will be assessed throughout the year as decisions to make water available for use are made and implemented. This includes refining the ecological objectives, assessing operational feasibility and potential risks and the ongoing monitoring of the seasonal outlook and river conditions.

Inflow scenario	Very Iow	Low	Moderate	High	Very high
Constraints					
Delivery options are limited due to high unregulated flows resulting in reduced channel capacity, limiting the operation of river infrastructure and inhibiting additional releases from storages.					_
Maximum annual usage on entitlements is up to 125 per cent of entitlement.					
Flow thresholds for existing river infrastructure may constrain the delivery of environmental water.					

Table 4: Current constraints on environmental watering for the Namoi River Valley

Constraints as they relate to specific watering actions are described in the standard operating considerations listed in section 3.5 below.

Based on the above outcomes sought and delivery constraints, Table 5 identifies flows that are in scope for Commonwealth environmental watering. Some specific watering requirements (flow magnitude, duration, timing and frequency) have also been listed, drawn from existing resources. The watering requirements for the Namoi River Valley will be developed in full by the state government as part of their long-term watering plan and will be reflected in future planning documents by the Commonwealth Environmental Water Office.
 Table 5: Long-term indicative elements of a flow regime in scope for Commonwealth

 environmental watering in the Namoi River Valley

Asset/Function	Indicative demands / events	Frequency (Maximum dry interval)
Lower Namoi River channel (habitat access and maintenance, connectivity, and opportunities for native fish)	 Small flows (minimum flows and baseflows): 8 ML/day at Boggabri and 13 ML/day at Wee Waa 72 ML/day at Boggabri and 105 ML/day at Wee Waa (Dec-June) 215 ML/day at Boggabri and 260 ML/day at Wee Waa (July-Nov) 	1 in 1–2 years
	 Medium flows: 500 ML/day at Bugilbone for 75 days (min. 25 consecutive days) in late spring/summer and winter 	1 in 2–3 years
	 Large flows: 1 800 ML/day at Bugilbone for 60 days (min. 6 consecutive days) in late spring/summer and winter 1 400–2 870 ML/day at Boggabri and 1 500– 3 150 ML/day at Wee Waa in Sept–Dec for min. 7 days 	1 in 3 years
Wetlands / Anabranches (riparian vegetation, off channel fish habitat, fish breeding and recruitment)	 Commence to fill wetlands in late spring/summer and winter over 45 days (min. 7 consecutive days): 4 000–4 500 ML/day at Bugilbone Greater than 4 600 ML/day at Boggabri (for Barbers Lagoon) Greater than3 300 ML/day at Duncan's gauge 	1 in 4–5 years
Peel River channel (habitat, water quality, connectivity, opportunities for native fish)	 Baseflows: Minimum variable low baseflow (greater than 3 ML/day) from Chaffey Dam Pulsed baseflow (~500 ML/day) from Chaffey Dam 	Annually
	Fresh flow (1 000–4 000 ML/day) to provide connectivity and wet medium-level benches, point bars and riparian zone	2–3 years Average return interval

Information sourced from NSW DPI Fisheries (2011), MDBA (2012), Foster (1999), Barma Water Resources et al. (2012), add personal communications.

3.5. Potential watering actions under different levels of water resource availability

Under certain levels of water resource availability, watering actions may not be pursued for a variety of reasons, including that environmental demand may be met by unregulated flows and that constraints and/or risks may limit the availability to deliver environmental water. Table 6 identifies the range of potential watering actions in the Namoi River Valley and the levels of water resource availability that relate to these actions.

 Table 6: Summary of potential watering actions for the Namoi River Valley

Broad Asset	Indicative demand	Applicable level(s) of resource availability						
		Very Low	Low	Moderate	High	Very High		
Lower Namoi River channel	 Small flows (minimum flows and baseflows): 8 ML/day at Boggabri and 13 ML/day at Wee Waa 72 ML/day at Boggabri and 105 ML/day at Wee Waa (Dec-June) 	1. Minimum baseflows: contribute to minimum flows during dry periods to provide refuge habitat and maintain resilience.						
	 215 ML/day at Boggabri and 260 ML/day at Wee Waa (July–Nov) 	2. High and low season baseflows: contribute to baseflows to refresh and maintain pools as refuge, manage water quality, and provide hydrological connectivity, allowing fish movement and building population resilience.						
	Medium flows: • 500 ML/day at Bugilbone for 75 days (min. 25 consecutive days) preferably in late spring/summer and late winter		3. Providing hydrological connectivity: contribute flows (freshes) to supplement river flows to inundate low level structures and provide longitudinal connectivity and access to habitat for native fish, which would also achieve movement, spawning and possible recruitment in some species.					
	 Large flows: 1 800 ML/day at Bugilbone for 60 days (min. 6 consecutive days) preferably in late spring/summer and late winter 1 400–2870 ML/day at Boggabri and 1 500–3 150 ML/day at Wee Waa in Sept–Dec for min. 7 days 		4. Managed flow recessions: contribute flows (freshes) to extend the duration and recession of unregulated flows to provide instream habitat, support native fish (movement, spawning, recruitment and condition), and maintain ecosystem funct and longitudinal connectivity.					

Wetlands / Anabranches	 Commence to fill wetlands preferably in late spring/summer and late winter over 45 days (min. 7 consecutive days): 4 000-4 500 ML/day at Bugilbone Greater than4 600 ML/day at Boggabri (for Barbers Lagoon) Greater than 3 300 ML/day at Duncan's gauge 		5. Connectivity with a natural unregulated fr commence to flow ar support riparian vege spawning, recruitmen	. Connectivity with anabranches: contribute flows to supplement atural unregulated freshes to connect the river with low ommence to flow anabranches, provide off channel habitat, upport riparian vegetation, and support fish movement, pawning, recruitment and condition.		
Peel River channel	 Baseflows: Minimum variable low baseflow (greater than 3 ML/day) from Chaffey Dam Pulsed baseflow (~500 ML/day) from Chaffey Dam 	6. Variable baseflows: Contribute to a variable baseflow, likely during or after a period of low flows, to provide refuge habitat, maintain resilience, provide hydrological connectivity, and maintain water quality, as well as fish movement and population resilience.				
	Fresh flow (1 000–4 000 ML/day)		7. In-channel freshes: in conjunction with ot habitat, support ecolo maintain riparian vego fish movement, spawn condition	Contribute to freshes her flows to provide ogical processes, etation, and support hing, recruitment and		

Note: Under certain resource availabilities, options may not be pursued for a variety of reasons including that environmental demand may be met by unregulated flows and that constraints and/or risks may limit the ability the deliver environmental water.

3.6. Potential watering actions – standard operational considerations

Table 6 above identifies the range of potential watering actions in the Namoi River Valley that give effect to the long-term demands and flow regime identified as being in scope for the Office to contribute environmental water to in any given year. The standard considerations associated with these actions are set out below.

1. Lower Namoi River minimum baseflows

Watering action: Contribute to minimum flows (including low flow variability) in the lower Namoi River during dry periods, to provide refuge habitat and maintain resilience. This action would contribute to maintaining flows and preventing a no flow situation.

Standard operational considerations:

- Environmental water would be delivered from Keepit Dam as in-channel flows, and will be managed within standard water delivery arrangements
- The flow limit for this action is generally 4 500 ML/day at Narrabri Creek (noting that the minor flood level at Bugilbone is 13 400 ML/day)
- The delivery rate will depend on antecedent conditions and available water, and may be delivered by supplementing other water sources.
- Water orders will be developed in conjunction with Water NSW to ensure operational feasibility and the achievement of environmental objectives.

Typical extent: This action could contribute flows to the lower Namoi River downstream of Keepit Dam to Bugilbone. The actual extent achieved will depend on antecedent conditions and availabile water. Consideration could also be given to delivering low baseflows in the Manilla River downstream of Split Rock Dam to maintain critical refuge during extreme dry conditions (using General Secutiry entitlements held in the upper Namoi River).

Approvals: Consult with NSW agencies (Water NSW, OEH and Fisheries) before implementing this action.

2. Lower Namoi River high/low season baseflows

Watering action: Contribute to baseflows in the lower Namoi River to refresh and maintain pools as refuge, manage water quality, and provide hydrological connectivity, allowing fish movement and building population resilience.

Standard operational considerations:

- Environmental water would be delivered from Keepit Dam as in-channel flows, and will be managed within standard water delivery arrangements
- The flow limit for this action is generally 4 500 ML/day at Narrabri Creek (noting that the minor flood level at Bugilbone is 13 400 ML/day)
- The delivery rate will depend on season and antecedent conditions, and could be delivered by supplementing other water sources.
- Water orders will be developed in conjunction with Water NSW to ensure operational feasiblity and the achievement of environmental objectives.

Typical extent: This action could contribute flows to the lower Namoi River downstream of Keepit Dam to Bugilbone. The actual extent achieved will depend on antecedent conditions and water availability.

Approvals: Consult with NSW agencies (Water NSW, OEH and Fisheries) before implementing this action.

3. Providing hydrological connectivity

Watering action: Contribute flows (freshes) to supplement river flows to inundate low level structures and provide longitudinal connectivity and access to habitat for native fish, which would also achieve movement, spawning and possible recruitment in some species.

The timing and duration of this action is important for achieving outcomes for target native fish species.

Standard operational considerations:

- Environmental water would be delivered from Keepit Dam as in-channel flows, and will be managed within standard water delivery arrangements
- The flow limit for this action is generally 4 500 ML/day at Narrabri Creek (noting that the minor flood level at Bugilbone is 13 400 ML/day)
- This action could be delivered by supplementing other river flows, with preference given to supplementing natural flows rather than regulated releases
- Water orders will be developed in conjunction with Water NSW to ensure operational feasibility and the achievement of environmental objectives.

Typical extent: This action could contribute flows to the lower Namoi River downstream of Keepit Dam, with the potential to coordinate releases to augment end of system flows to the Barwon-Darling system.

Approvals: Consult with NSW agencies (Water NSW, OEH and Fisheries) before implementing this action.

4. Managed flow recessions in the lower Namoi River

Watering action: Contribute flows (freshes) to extend the duration and recession of unregulated flows to provide instream habitat, support native fish support native fish (movement, spawning, recruitment and condition), and maintain ecosystem function and longitudinal connectivity.

The timing and duration of this action is important for achieving outcomes for target native fish species.

Standard operational considerations:

- Environmental water would be delivered from Keepit Dam as in-channel flows, and will be managed within standard water delivery arrangements
- The flow limit for this action is generally 4 500 ML/day at Narrabri Creek (noting that the minor flood level at Bugilbone is 13 400 ML/day)
- This action would be delivered by supplementing other river flows, with preference given to supplementing natural flows rather than regulated releases. Consideration may be given to augmenting regulated releases to increase peak flows, or to provide a secondary flow peak, and to provide a more natural recession.
- Water orders will be developed in conjunction with Water NSW to ensure operational feasiblity and the achievement of environmental objectives.

Typical extent: This action could contribute flows to the lower Namoi River downstream of Keepit Dam, with the potential to coordinate releases to meet end of system flow requirements in the Barwon-Darling system.

Approvals: Consult with NSW agencies (Water NSW, OEH and Fisheries) before implementing this action.

5. Connectivity with wetlands/anabranches in the lower Namoi

Watering action: Contribute flows to supplement natural unregulated freshes to connect the Namoi River with low commence to flow anabranches, provide off channel habitat, support riparian vegetation, and support fish movement, spawning, recruitment and condition.

Standard operational considerations:

- Environmental water would be delivered from Keepit Dam as in-channel flows, and will be managed within standard water delivery arrangements
- This action would be delivered in conjunction with a natural unregulated flow event (likely in the order of 2 000–4 000 ML/day
- Environmental water may be used to slow and extend the flow recession following an unregulated flow event of an appropriate size to maintain inundation in anabranch habitats
- Environmental water may delivery may also be considered to add to an unregulated event to deliver a secondary flow peak that allows reconnection of anabranch habitat for native fish outcomes
- Water orders will be developed in conjunction with Water NSW to ensure operational feasibility and the achievement of environmental objectives.

Typical extent: This watering action would contribute flows to low commence to flow anabranch channels in the lower Namoi River system. Providing a reconnection flow is important for native fish outcomes.

Approvals: Consult with NSW agencies (Water NSW, OEH and Fisheries) Local Land Services, peak irrigation bodies and landholders before implementing this action.

6. Variable baseflows in the Peel River

Watering action: Contribute to a variable baseflow in the Peel River, likely during or after a period of low flows. This will provide refuge habitat, maintain resilience, provide hydrological connectivity, and maintain water quality, as well as fish movement and population resilience.

Standard operational considerations:

- Water will be delivered to the Peel River from Chaffey Dam as in-channel flows, and will be managed within standard water delivery arrangements
- Water orders will be developed in conjunction with Water NSW to ensure operational feasiblity and the achievement of environmental objectives
- The actual flow rate will be determined based on antecedent conditions and flows through the season.

Typical extent: This action will contribute flows to the Peel River between Chaffey Dam and the Namoi River.

Approvals: Consult with NSW agencies (Water NSW, OEH, NSW Office of Water and NSW Fisheries) before implementing this action.

7. In-channel freshes in the Peel River

Watering action: Contribute to freshes to the Peel River, in conjunction with other flows to provide habitat, support ecological proceses, maintain riparian vegetation, and support fish movement, spawning, recruitment and condition.

Standard operational considerations:

- Water will be delivered in conjunction with other in-stream freshes or water sources, such as tributary flows or a Water Sharing Plan stimulus flow. Stimulus flows only occur from Chaffey Dam when certain storage conditions are met. In the absence of a stimulus flow, releases of environmental water will be timed to take advantage of tributary inflows or other water delivery/transfers.
- Water will be delivered to the Peel River from Chaffey Dam as in-channel flows, and will be managed within standard water delivery arrangements
- Water orders will be developed in conjunction with Water NSW to ensure operational feasibility and the achievement of environmental objectives
- The actual flow rate will be determined based on antecedent conditions and flows through the season.

Typical extent: This action will contribute flows to the Peel River between Chaffey Dam and the Namoi River.

Approvals: Consult with NSW agencies (Water NSW, OEH and Fisheries) Local Land Services, peak irrigation bodies and landholders before implementing this action.

4. Long-term water availability

4.1. Commonwealth environmental water holdings

The Commonwealth holds the following entitlements in the Namoi River Valley:

- General Security Upper Namoi
- General Security Lower Namoi
- General Security Peel

The full list of Commonwealth environmental water holdings can be found at <u>www.environment.gov.au/topics/water/commonwealth-environmental-water-office/about-commonwealth-environmental-water/how-much</u> and is updated monthly.

4.2. Other sources of environmental water

There are currently no other sources of held environmental water in the Namoi River Valley.

4.3. Planned environmental water

In addition to water entitlements held by environmental water holders, environmental demands may also be met via natural or unregulated flows and water provided for the environment under rules in state water plans (referred to as 'planned environmental water').

The Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated Water Sources (2004) provides for planned environmental water and stock and domestic (replenishment flows) releases. Water deliveries to meet irrigation orders may provide baseflows in some sections of the Namoi River. Supplementing releases with Commonwealth environmental water may increase the potential for environmental objectives to be achieved and assist with delivery efficiency.

The Peel Water Sharing plan has provision for a stimulus flow of 1 600 ML to be released under certain conditions. Once the capacity of Chaffey Dam has been increased the stimulus flow will be replaced by a 5 000 ML Environmental Contingency Allowance.

The Bureau of Meteorology provides a seasonal streamflow forecasting service, which estimates the potential for low, median or high flows for the coming three months ahead.

5. Next steps

5.1. From planning to decision making

It is important to distinguish between planning and operational decision making. As shown in Figure 7, planning allows the Office to manage the environmental water portfolio in a holistic manner and is an exercise in developing a broad approach or intention, based on the key drivers (demand and supply).

Decision making throughout each year builds on the intention by considering in more detail the specific prevailing factors and additional factors such as costs, risks, constraints to water delivery and market conditions.



Figure 4: Planning and decision-making for Commonwealth environmental water use

5.2. Further information

For further information on how the Office plans for water use, carryover and trade, please visit our web site <u>www.environment.gov.au/topics/water/commonwealth-environmental-water-office</u>

- Water use: www.environment.gov.au/topics/water/commonwealth-environmental-wateroffice/assessment-framework
- Carryover: <u>http://www.environment.gov.au/topics/water/commonwealth-environmental-water-office/portfolio-management/carryover</u>
- Trade: Discussion Paper Trade of Commonwealth Environmental Water and Commonwealth Environmental Water Trading Framework: <u>http://www.environment.gov.au/water/cewo/trade/trading-framework</u>

Attachment A – Expected outcomes from the Basin-wide environmental watering strategy

Expected outcomes from the Basin-wide Environmental Watering Strategy (MDBA 2014) that are relevant to the Namoi are described below.

RIVER FLOWS AND CONNECTIVITY

Baseflows are at least 60 per cent of the natural level.

Contributing to a 10 per cent overall increase in flows in the Barwon-Darling.

A 10-20 per cent increase in the frequency of freshes and bankfull.

VEGETATION

Maintain the current extent of forest and woodland vegetation and non woody vegetation.

No decline in the condition of black box, river red gum and coolibah.

Improved recruitment of trees within black box and river red gum communities

Vegetation extent

Area of river red gum (ha)	Area of black box (ha)	Area of coolibah (ha)	Shrublands	Non–woody water dependent vegetation
6 100	800	4 200		Closely fringing or occurring within the Namoi River

WATERBIRDS

Maintain current species diversity

Increase Basin-wide abundance of waterbirds by 20–25 per cent by 2024

A 30–40 per cent increase in nests and broods (Basin-wide) for other waterbirds

Up to 50 per cent more breeding events (Basin-wide) for colonial nesting waterbird species

FISH

No loss of native species

Improved population structure of key species through regular recruitment, including:

- Short-lived species with distribution and abundance at pre-2007 levels and breeding success every 1–2 years
- Moderate to long-lived with a spread of age classes and annual recruitment in at least 80% of years

Increased movements of key species Expanded distribution of key species and populations

Key species for the Namoi include:

Species	Specific outcomes	In-scope for Commonwealth environment water in the Namoi?
Freshwater catfish (Tandanus tandanus)	Expand the core range of at least 3-5 existing populations (Candidate sites include Namoi River)	Yes
Golden Perch (Macquaria ambigua)	A 10–15 per cent increase of mature fish (of legal take size) in key populations	Yes
Murray cod (Maccullochella peelii peelii)	A 10–15 per cent increase of mature fish (of legal take size) in key populations	Yes
Olive perchlet (Ambassis agassizii)	Establish or improve the core range of 2-5 additional populations (Candidate sites include Namoi River)	Possibly (Once widespread. Current extent unknown in Namoi)
River blackfish (Gadopsis marmoratus)	Establish or improve the core range of 2–4 additional populations (candidate sites include Namoi Rivers)	Yes
Silver Perch (Bidyanus bidyanus)	Expand the core range of at least 2 existing populations (Candidate sites include Namoi River)	Possible (Current extent unknown in Namoi)
Southern purple-spotted gudgeon (Mogurnda adspersa)	Establish or improve the core range of 2–5 additional populations – (priority catchments include Namoi)	Possibly (Once widespread. Current extent in Namoi unknown. Some stocking has occurred)

Important Basin environmental assets for native fish in the Namoi

Environmental asset	Key movement corridors	High Biodiversity	Site of other Significance	Key site of hydrodynamic diversitv	Threatened species	Dry period / drought refuge	In-scope for C'th water
Namoi (Gunnedah to Walgett)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peel River downstream of Chaffey Dam		Yes		Yes	Yes	Yes	Yes
Namoi River upstream of Keepit Dam		Yes		Yes	Yes		No

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