Intersecting Streams – 2022 updated estimate of the BDL, LTDLE factors and the held environmental water recovered

The Intersecting Streams is a water resource plan area that is located near Bourke, in the far north-western corner of NSW. It occupies an area of approximately 120,000 square km.

The Intersecting Streams area is largely undeveloped. It includes the NSW parts of the Culgoa, Moonie, Narran, Paroo and Warrego rivers and Yanda Creek. Nearly all of the consumptive water use in this area formerly occurred at the Toorale property that was purchased by the Commonwealth in 2008. The purchase of Toorale was to recover water for the environment and help bridge the gap between the baseline diversion limit (BDL) and the sustainable diversion limit (SDL) under the Basin Plan.

Prior to purchase, Toorale's use comprised of water extracted from the Darling and Warrego Rivers. The Darling river extractions are accounted for in the Barwon-Darling SDL resource unit and are largely modelled. The Warrego River extractions are accounted for in the Intersecting Streams SDL resource unit and included entitlements that diverted water onto the Western Warrego floodplain.

The Basin Plan 2012 Intersecting Streams BDL estimate did not include an estimate of Toorale water use from the Warrego River as there are no available records of historical use or a BDL model scenario for the Warrego River to determine an estimate.

The 2012 BDL estimates can be updated to incorporate new information through the accreditation of a water resource plan, as long as the revised estimate remains consistent with the BDL description set out in Schedule 3 of the Basin Plan. Updated BDL estimates can also be used to calculate updated long-term diversion limit equivalence (LTDLE) factors[1].

In order to include an estimate of Toorale water use in the Intersecting Streams BDL estimate, NSW and the Murray–Darling Basin Authority (MDBA) have identified a series of reports that describe how water was managed on Toorale, and worked collaboratively to determine a revised estimate of the Intersecting Streams BDL and LTDLE factors for the water recovered from Toorale.

As at February 2022, the best available information indicates an updated Intersecting Streams BDL for take from watercourses (excluding basic rights) of 19.3 gigalitres per year (GL/y), up from the initial Basin Plan 2012 estimate of three GL/y. The revised LTDLE factors give a calculated water recovery volume of 16.3 GL/y. Ongoing work could further improve these estimates.

[1] Long-term diversion limit equivalent (LTDLE) factors have been established to accurately assess how much water has been recovered for the environment, and to guide future water recovery decisions. For further information see LTDLE (CAP) factors - Water in New South Wales (nsw.gov.au)

PUB22/70 | TMP-MC-FS-V1.2

This information sheet provides supporting analysis and background relevant to the February 2022 update to the Intersecting Streams BDL estimate for take from watercourses (excluding basic rights), which now includes an estimate of Toorale water use that aligns with the Basin Plan BDL description. It also presents the revised LTDLE factors and calculation of water recovery from the Toorale entitlements in the Darling and Warrego Rivers.

Background

Intersecting Streams BDL estimate from the Basin Plan 2012

Schedule 3 of the Basin Plan defines the Intersecting Streams BDL for several forms of water take. This paper relates to an update to the Intersecting Streams BDL estimate for take from watercourses (excluding basic rights), which is defined as "the long-term annual average take averaged over the period July 1993 to June 1999".

The Basin Plan 2012 BDL estimate for this form of take is 3,000 megalitres per year (ML/y)[2]. The basis for this estimate was a NSW survey in 2000 that assessed irrigation use over the years 1993 94 to 1998–99. This method was used as there are no records of historical usage available in the Intersecting Streams or an existing BDL model. This estimate has been used for reporting under the Murray-Darling Basin Cap on diversions since 2000. The 2012 BDL estimate of 3,000 ML/y excluded Toorale water use and was thus expected to be an under-estimate of take under BDL conditions.

Entitlements in the Intersecting Streams SDL resource unit

In 2012, NSW issued a total entitlement volume of 35,750 ML under the '*Water Sharing Plan for the Intersecting Streams Unregulated and Alluvial Water Sources 2011*' (see Table 1). Under the Basin Plan, these entitlements align to take from watercourses (excluding basic rights).

Of these entitlements:

1. 17,924 ML are for town, stock and domestic, and unregulated use or other consumptive uses, including by small opal mines. The Basin Plan 2012 BDL estimate for these entitlements is 3,000 ML/y.

The remaining entitlements of 17,826 ML are owned by the Commonwealth Environmental Water Holder (CEWH). These are from the 2008 purchase of Toorale and are now classified as held environmental water (HEW). An estimate of their use under baseline conditions is part of the updated Intersecting Streams BDL described here. These entitlements are of two classes:

2. 8,106 ML of unregulated irrigation class extracted from the Warrego River (these are modelled in the revised Barwon-Darling BDL model) and
3. 9,720 ML of special additional high flow class, which diverted diversions from the Warrego River to the Western Warrego floodplain.

Also part of the 2008 Toorale purchase, but not part of the Intersecting Streams SDL resource unit, is a further 7,672 ML of entitlements from the Darling River in the Barwon-Darling Watercourse SDL

[2] Basin Plan BDL calculation method is defined in the Water resource assessments for without-development and baseline conditions, Murray–Darling Basin Authority technical report 2010/20 Version 2 (MDBA 2011) for surface water.

resource unit (see Table 2 for details of Toorale entitlement volume by classes in both the Warrego and Darling Rivers).

Updating the BDL estimate for Intersecting Streams

The updated Intersecting Streams BDL of 19.3 GL/y for take from watercourses (excluding basic rights) is presented in Table 1 and comprises three components:

1. For the 17,924 ML entitlement of other consumptive uses, the BDL estimate remains 3,000ML/y. This is the best available information and was determined from the volumetric conversion process in 2000 based on crop areas survey and assessed irrigation requirements over the years 1993–94 to 1998–99. It thus reflects the BDL description.
2. For the 8,106 ML entitlement of Warrego-Toorale unregulated irrigation, the revised Barwon-Darling Watercourse BDL model (LT92_30.sqq) is used to determine the average use over the period July 1993 to June 1999. This is 6,626 ML/y and aligns with the Intersecting Streams BDL description for take by watercourses (excluding basic rights). This estimate is an update from the interim estimate of 4,060 ML/y defined in the February 2019[3] that was determined over the long-term average historical climate conditions (1895-2009).
3. For the 9,720 ML entitlement of Warrego-Toorale special additional high flow, Toorale used this entitlement to divert flows from the Warrego River to flow across the western Warrego floodplain with simple block bank structures. These banks pre-date NSW Water Acts and the volumes diverted have never been monitored. Initially these entitlements were area-based, and subsequently they were converted to the current volume-based entitlements of9,720 ML. Special additional high flow entitlements in the *Water Sharing Plan for the Intersecting Streams Unregulated and Alluvial Water Sources*[4] restricts use to annual allocation (adjusted for trade), and no carryover is allowed. The restriction generally limits use to the entitlement volume, noting the diversion has never been monitored.

The best available information available of the long-term average use of this entitlement is based on modelling work specifically developed by independent consultants to inform the ongoing strategic management of Toorale:

- 24,000 ML/y (Aurecon 2012), based on the difference of mean flow to the Darling River before and after the partial decommissioning proposal, minus 4,060 ML/y use at cotton farms[5].
- 14,000 ML/y (Alluvium 2018) - further modelling work on water savings from the Warrego western floodplain for the Commonwealth Department of Agriculture and Water Resources and NSW Office of Environment and Heritage is ongoing and due to be completed in 2022.

These estimates of use vary considerably but are both greater than the entitlement volume for the Warrego-Toorale special additional high flow entitlements. Similarly, the average modelled use over

[3] Intersecting Streams — updated estimates of the BDL, LTDLE factors and the held environmental water recovered, February 2019, INT 19/10022

[4] Water Sharing Plan for the Intersecting Streams Unregulated and Alluvial Water Sources 2011 (plan), (clause 42(4) & (6)) (https://legislation.nsw.gov.au/view/whole/html/inforce/current/sl-2011-0573)

[5] Aurecon (2012, D13/5458), Alluvium (in progress), MDBA (2016) WAM report (table 7, page 29) www.mdba.gov.au/publications/mdba-reports/water-audit-monitoring-report-2011-12

the BDL estimate period July 1993 to June 1999 from both models is also greater than the entitlement volume.

NSW and MDBA reached agreement on a working principle for updating the BDL estimate that, 'the long-term average estimate of water use should equal or be less than the entitlement volume'. Thus, the BDL estimate for the Warrego-Toorale special additional high flow component is set to the total entitlement volume of 9,720 ML. This is consistent with the BDL description. Future work may trigger additional work to reissue the entitlements to a more representative level or recommend some other process to align historical usage with the entitlement framework.

Table 1. 2022 BDL estimate and LTDLE factors for take from watercourses (excluding basic rights) and water recovery volume in the Intersecting Streams SDL resource unit

BDL item	Class	Entitlement volume (ML)	2022 BDL Estimate		Proposed LTDLE factor	HEW recovery (Bridging the gap) (ML/y)
			Volume (ML/y)	Method		
(1)	All other consumptive use	17,924	3,000	NSW 2000 crop survey estimate	0.167	0
(2)	Warrego-Toorale unregulated irrigation	8,106	6,626	Barwon–Darling revised BDL model	0.817	6,626
(3)	Warrego-Toorale special additional high flow	9,720	9,720*	Entitlement volume as per LTDLE factor determination principle	1.000	9,720
(1)+(2)+(3)	**Total**	**35,750**	**19,346**			**16,346**

Updated LTDLE factors and water recovery from Toorale

The LTDLE factors determined for the Toorale entitlements in both the Warrego River and Darling River are presented in Tables 1 and 2. Calculation of these factors and the resulting water recovery volumes followed the approach defined in NSW Department of Industry's water reform technical report titled Derivation of LTDLE factors in NSW (2018)[6].

For the Toorale entitlements in the Warrego River, the revised LTDLE factors are 0.817 and 1.000 for the Warrego-Toorale unregulated irrigation and Warrego-Toorale special additional high flow entitlements respectively. The average use over the period July 1993 to June 1999 is set out in Table 1.

For the Toorale entitlements in the Darling River, the calculation of the water recovery volume is based on the revised LTDLE factors of 1.000 presented in Table 2, which is appropriate for the currently issued entitlements. It is noted that the current entitlements were re-issued in January

[6] NSW Department of Industry Water reform technical report: Derivation of LTDLE factors in NSW. First published in May 2018. https://www.industry.nsw.gov.au/__data/assets/pdf_file/0019/162181/techncial-paper-derivation-technical-factors-nsw.pdf

2015, based on individual shares. These entitlements are not directly comparable to the 'annual volumetric limit' (AVL) scheme entitlements that were in place under the BDL (or Cap) conditions. This indicates that the Toorale purchase resulted in a total of 24,708 ML/y of HEW to contribute towards 'bridging the gap' from the BDL to the SDL, across two SDL resource units.

Table 2 2022 Toorale entitlements for Intersecting Streams and Barwon-Darling Watercourse SDL resource units, with corresponding LTDLE factors and proposed water recovery volumes

SDL resource unit	Class	Entitlement volume (ML)	Proposed LTDLE factors	HEW recovery (bridging the gap)
Intersecting Streams	Warrego River-Toorale unregulated irrigation	8,106	0.817	6,626
	Warrego River-Toorale special additional high flow	9,720	1.000	9,720
Barwon-Darling Watercourse	Darling River-Toorale: Darling A class Darling B class Darling C class Darling FPH**	 73 2,754 5,535 [not issued]	 1.000* 1.000* 1.000*	 73 2,754 5,535
Total Toorale Irrigation (Warrego River + Darling River)		**26,188**		**24,708**

* Factors for the Barwon–Darling Watercourse as set out in the NSW Department of Industry technical report, Derivation of LTDLE Factors in NSW (May 2018)

** NSW floodplain harvesting policy 2013 is currently being implemented

Future work

The NSW Government may further improve the estimate of the BDL for the Barwon–Darling Watercourse as a result of updated modelling.

Further work being undertaken by the NSW and the Commonwealth governments indicates that the Barwon–Darling model may also produce a better estimate of Toorale water use (in particular the special additional high flows entitlements). This has not been confirmed by the MDBA.

Once the specialised consulting firm has delivered its findings, it would be appropriate to review the findings about the long-term average use of the Warrego-Toorale special additional high flow

entitlements and to reassess the BDL estimate and the amount of water recovery that has occurred. The planned process is:

- The consulting firm will share provisional results with MDBA and NSW modellers to build confidence in the approach taken
- NSW Government and MDBA will consider setting up an independent panel to review the consulting firm's modelling work in more detail
- NSW Government will consider the merit in representing the outcomes of the consulting firm's work in the Barwon–Darling model to provide a way of estimating future water use on an annual basis — so that the average level of water recovery and use is reflected on Warrego.

If the modelling indicates that the long-term estimate of water use is greater than the volume of entitlements issued, responses will be determined at that time.