

Intersecting Streams—updated estimates 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, with nearly all consumptive water use formerly occurring at the Toorale property that was purchased by the Commonwealth in 2008. Toorale's use comprised of water extracted from the Barwon–Darling and Warego systems and water diverted from the Warrego River onto the Westen Warrego floodplain.

There are no available records of historical usages or an existing baseline diversion limit (BDL) model scenario for the Warrego, as exists in the other river systems for calculation of draft long-term diversion limit equivalence (LTDLE) factors. The Intersecting Streams BDL calculations excluded Toorale diversions, and the Barwon–Darling model only considers use relevant to that system.

The Murray–Darling Basin Plan places increased emphasis on the consideration of total diversion volumes, with a revised estimate of the Intersecting Streams BDL and LTDLE factors for the water recovered from Toorale. NSW and the Murray–Darling Basin Authority (MDBA) have identified a series of reports that describe how water was managed on the Toorale property, and are working collaboratively to estimate consumptive use as defined by the Basin Plan.

The best available information for the Intersecting Streams as at September 2018 indicates a BDL of 16.8 gigalitres per year, up from the Basin Plan 2012 estimate of three gigalitres per year. The revised LTDLE factors for entitlements (see Table 1) gives a calculated water recovery volume of 13.8 gigalitres per year and a sustainable diversion limit (SDL) of three gigalitres per year. Ongoing work could potentially identify additional increases.

This information sheet provides supporting analysis, including background information relevant to the BDL and the Toorale property. Relevant new information is combined with existing knowledge to provide updated BDL, LTDLE factors and water recovery for the Intersecting Streams.

Background

Intersecting Streams entitlements

In 2012, NSW issued a total entitlement volume of 35,750 megalitres under the 'Water Sharing Plan for the Intersecting Streams Unregulated and Alluvial Water Sources 2011' (see

Table 1. BDL, SDL and water recovery volume in the Intersecting Streams SDL resource unit). Of these entitlements, the Commonwealth Environmental Water Holder (CEWH) owns 17,826 megalitres—all from the Toorale purchase, now classified as held environmental water (HEW).

The Intersecting Stream entitlements include the Culgoa, Moonie, Narran, Paroo and Warrego rivers and Yanda Creek. In addition to the Warrego component of the Toorale water use, the other groups of entitlements issued on the Intersecting streams are:

- other unregulated and, stock and domestic entitlements on the Warrego (above Ford's Bridge and not modelled as part of the Barwon–Darling integrated quantity and quality model (IQQM)—1,326 megalitres and 42.5 megalitres respectively
- other special additional high flows on the Warrego (also not modelled)—2,430 megalitres

- the balance of unregulated and stock and domestic entitlements in the Intersecting Streams on other rivers (also not modelled)—14,125.5 ML.

These entitlements are used for town, stock and domestic, and unregulated use—or other consumptive purposes (17,924 megalitres), including by small opal mines, and they have different water usage behaviour to Toorale. This means that an estimate of one type of usage is not transferable to other user groups.

Historical BDL Estimates

Schedule 3 of the Basin Plan defines the BDL for Intersecting Streams. This paper relates to parts (a) and (b) of the BDL definition, where:

- part (a) is the take from watercourses (excluding basic rights), defined as the long-term average take over the period July 1993 to June 1999
- part (b) is the take from watercourses under basic rights, calculated from take under the level of development that existed on 30 June 2009.

The Basin Plan includes an estimate of 3,000 megalitres per year¹ For part (a). A NSW survey in 2000 on volumes of use reported under the Cap (a cap on diversions of surface water from the Murray–Darling Basin that was established in 1995 to limit future increases in such diversions) for the valley as the basis for this estimation. Cap reporting did not include an estimate that aligns with part (b) of the BDL and was expected to be an under-estimate of take from the valley under BDL conditions.

There are no records of historical usage available in the Intersecting Streams valley, or an existing BDL model, as were used to determine planning assumptions in other NSW systems.

Since 2000 NSW has provided a simple estimate of actual use for Intersecting Streams under the Cap on diversions based on expert opinion, and taking into consideration the very low levels of development. The estimate was based on the long-term average use of all entitlements in the Intersecting Streams of 3,000 megalitres per year. The estimate excluded Toorale use, as the Barwon–Darling model included a Toorale water use representation.

Toorale entitlements and water use—now held environmental water entitlements

The Intersecting Streams SDL resource unit is largely undeveloped. Nearly all consumptive water use formerly occurred at the Toorale property that was purchased by the Commonwealth in 2008. This information sheet draws upon available but limited knowledge, including work by consultants, that describes water use on the Toorale property.

For irrigation purposes, the Toorale property had access to another entitlement of 7,672 megalitres from the Darling River. The water recovered in 2008 as part of the Toorale property acquisition bridges the gap between the BDL and the SDL under the Basin Plan, as part (a) of the BDL for intersecting streams is tied to 1993–99 average take.

The NSW planning assumptions use the modelled long-term average use of the irrigation entitlements (4,060 megalitres per year for Warrego and 15,667 megalitres per year for the Darling) from The Basin Plan BDL model run (#871). The model does not represent Class A entitlements. Full use of Class A entitlements is assumed, equal to 67 megalitres per year, because of the small volumes involved.

¹ 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. The estimate of the surface water BDL can be updated through the assessment of improved information.

Updated LTDLE factors

Calculation of the LTDLE factors for Warrego and Darling entitlements and the resulting water recovery volumes (see Table 2) followed the approach defined in NSW Department of Industry's water reform technical report titled *Derivation of LTDLE factors in NSW (2018)*.²

Western Warrego floodplain

The Western Warrego floodplain diversions were not considered previously in the calculation of Intersecting Streams BDL, nor included in the Toorale water use modelled in the Barwon–Darling IQQM BDL model.

Toorale uses 9,720 megalitres of special additional high flow entitlements to divert flows from the Warrego River to flow across the western Warrego floodplain with simple block bank structures. These banks predate NSW water acts and the volumes diverted have never been monitored. Special additional high flow entitlements in the Water Sharing Plan for the Intersecting Streams Unregulated and Alluvial Water Sources³ 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 following estimates of long-term average use of these entitlements are the best available information, based on modelling work specifically developed by independent consultants to inform the ongoing strategic management of Toorale:

- 24 gigalitres (Aurecon 2012), based on the difference of mean flow to the Darling River before and after the partial decommissioning proposal, minus 4.06 gigalitres per year use at cotton farms⁴(see Table 1)
- 14 gigalitres per year (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 due to be completed in late 2018.

The estimates of use vary considerably but are both greater than the entitlement volume for Toorale special additional high flow entitlements.

NSW and MDBA reached agreement on a working principle for planning assumptions and determining LTDLE factors that, 'the long-term average estimate of water use should equal or be less than the entitlement volume'. The review may trigger additional work to reissue the entitlements to a more representative level, or recommend some other process to align the accepted historical usage with the entitlement framework.

As a provisional step in gaining accreditation for the water resource plan by 30 June 2019, the special additional high flow entitlement long-term average estimate of use for Toorale is set to the total entitlement volume, and an LTDLE factor of 1.0 applied (see

Table 1. BDL, SDL and water recovery volume in the Intersecting Streams SDL resource unit).

² NSW Department of Industry Water reform technical report: Derivation of LTDLE factors in NSW. First published in May 2018. industry.nsw.gov.au/__data/assets/pdf_file/0019/162181/technical-paper-derivation-technical-factors-nsw.pdf INT18/88546

³ Water Sharing Plan for the Intersecting Streams Unregulated and Alluvial Water Sources 2011 (plan), (clause 42(4)&(6)) (legislation.nsw.gov.au/#/view/regulation/2011/573/full)

⁴ 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

Table 1. BDL, SDL and water recovery volume in the Intersecting Streams SDL resource unit.

BDL item	Class	Entitlement volume (ML)	Long-term estimate of use (ML/y)	Proposed LTDLE factor	HEW recovery (bridging the gap) (ML/y)
(1)	Warrego—Toorale—unregulated irrigation	8,106	4,060 Basin Plan Barwon–Darling model	0.500	4,060
(1)	Warrego—Toorale—special additional high flow	9,720	9,720* water use equals entitlement	1.000	9,720
(2)	All other consumptive use	17,924	3,000 estimate of long-term use from Cap reporting	0.167	0
(1)+(2)	Total Intersecting Streams	35,750	16,780		13,780

* Water use equals entitlement based on the agreed working principle for planning assumptions

Table 2 BDL, LTDLE factor and proposed water recovery volume for Toorale across both the Warrego (Intersecting Streams) and Barwon–Darling

Class	Entitlement volume (ML)	Long-term average estimate of use (Basin Plan BDL Barwon–Darling Model #871) (ML/y)	Proposed LTDLE factor	HEW recovery (bridging the gap) (ML/y)
Warrego River—Toorale unregulated irrigation	8,106	4,060	0.500	4,060
Darling River–Toorale:				
Darling A class	67	67	1.000*	67
Darling B class	2,527	3,188 [#]	1.000*	3,188
Darling C class	5,078	11,716 [#]	1.000*	11,716
Darling FPH**	-	696	1.000*	696
Sub-total Darling	7,672	15,667	-	15,667
Total Toorale Irrigation (Warrego+Darling)	15,778	19,727		19,727

* Factors for the Barwon–Darling 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

[#] There is no volumetric limit for B & C class. Diversions depend upon a set of rules and meeting threshold set at upstream and downstream gauges. MDBA has raised this issue (i.e. higher use than entitlement face value) with NSW and is part of fixing bugs in the B-D Source model.

Future work

In the course of finalising its WRP, the NSW Government may improve the estimate of the BDL for the Barwon–Darling as a result of updated modelling. updated modelling could change the Warrego unregulated entitlements long-term use estimate, the relevant LTDLE factor, and the recovery estimate. Preliminary work suggests water recovery may decrease by about 0.5 gigalitres per year.

Further work being undertaken by the NSW and the Commonwealth governments indicates that the Barwon–Darling model may produce a better estimate of part (a) of the BDL. This has not been confirmed by the MDBA.

Once consulting firm Alluvium 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 amount of water recovery that has occurred. The estimate of the special additional high flow may need to be updated. The planned process is:

- Alluvium 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 Alluvium modelling work in more detail
- NSW Government will consider the merit in representing the outcomes of the Alluvium 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.