

Long-term diversion limit equivalence factors for Redbank

In 2018 NSW Department of Industry released a set of proposed new long-term diversion limit equivalence (LTDLE) factors.

In the Murrumbidgee, the Lowbidgee entitlements were split into three values—Redbank North, Redbank South, and Nimmie Caira—to reflect the proportionally high degree of ownership by environmental water holders and differences in activation compared to consumptive water users.

The Murrumbidgee integrated quantity and quality model (IQQM) produces a single, long-term diversion number for Redbank, and the LTDLE calculation process assumed that north and south would be split based on relative area (65% south and 35% north), consistent with the assumptions adopted for sustainable diversion limit (SDL) area modelling and the proposed baseline diversion limit (BDL) update for the Murrumbidgee.

The public consultation process produced feedback that the north/south split should instead be based on historical diversions consistent with the default approach adopted in other cases where the models could not provide the required resolution of diversions by entitlement class.

This suggestion was accepted by NSW Department of Industry, and this information sheet outlines the investigations conducted and the revised LTDLE factors for north and south Redbank.

Historical Background

The Lowbidgee area used to be a flood-control area that was permitted by special parts of the NSW *Water Act 1912* to divert water from high flows. As part of a proposal for large-scale water recovery, NSW created a new type of Murrumbidgee entitlement called supplementary (lowbidgee), and issued 747 gigalitres of shares to individuals and groups.

The shares were originally issued to three entitlements, as shown in Table 1.

Table 1. Breakdown of initial supplementary (lowbidgee) share entitlements.

Name	Entitlement	Share (ML)
Nimmie-Caira	40AL412442	381,000
Redbank North	40AL412444	211,000
Redbank South	40AL412443	155,000

NSW Office of Environment and Heritage owns Redbank South, which represents the water used in Yanga National Park. Yanga National Park was gazetted in 2007 after being purchased by the government in July 2005. The area was formerly a grazing and forestry-based business.

The Commonwealth owns Nimmie-Caira as a result of the deal to buy all the farms and water rights in 2013. A separate Murray–Darling Basin Authority (MDBA) report covers the agreed recovery value for Nimmie-Caira.

The Redbank North entitlement was collectively owned when created in 2012. Nineteen separate owners have subsequently split from the original entitlement, leaving Balranald Shire Council as the remaining owner of the original entitlement.

Current entitlements

Table 2. Supplementary (lowbidgee) entitlements

Entitlement	Share
40AL412442	393,117
40AL412443	152,501
40AL412444	3,417
40AL416264	93,919
40AL416728	0
40AL417025	5,339
40AL417026	2,532
40AL417027	2,457
40AL417028	2,457
40AL417029	11,827
40AL417030	22,350
40AL417031	20,109
40AL417032	1,897
40AL417033	2,773
40AL417034	7,067
40AL417035	2,984
40AL417036	2,984
40AL417037	402
40AL417038	13,506
40AL417039	1,000
40AL417040	1,822
40AL417041	41
40AL417101	2,499

The 40AL416264 entitlement was created on 21 November 2014 by splitting from the Redbank North entitlement with 106,036 shares. That licence split again on 4 March 2016 to create 40AL416728 with 12,117 shares that was used for one year then sold to the Commonwealth and added to the Nimmie-Caira entitlement. All other non-original entitlements were split from the Redbank North entitlement on 13 February 2018, and none has a record of water usage since that date.

Usage and trade

Nimmie-Caira

The Nimmie-Caira entitlement (40AL412442) has recorded usage in 2012–13. After that, it temporarily traded all its allocation to the Redbank South entitlement (40AL412443) and records zero usage from 2013–14. In 2016–17, entitlement shares totalling 12,117 was added to the Nimmie-Caira entitlement through the purchase of 40AL416728 by the Commonwealth, and also by temporary trades each year to Redbank South. Usage at Redbank South should be apportioned pro rata according to the originating licenses.

Redbank South

Table 3. Redbank South entitlement share trade and usage.

Year	AWD + trade	Usage
2012–13	155,000	1
2013–14	155,000	0
2014–15	536,000	58,248
2015–16	536,000	1,036
2016–17	536,000	20,567
2017–18	548,117	1,800
2018–19	545,618	Nil to date

The Redbank South entitlement traded 2,499 of its shares to 40AL417101 in 2017–18, leaving a share of 152,501.

Redbank North

Table 4. Redbank North entitlement share trade and usage.

Year	AWD + trade	Usage
2012–13	211,000	14,629.3
2013–14	211,000	8,392
2014–15	211,000	20,068
2015–16	104,964	2,269
2016–17	104,964	6,140
2017–18	104,964	1,009
2018–19	3,417	Nil to date

40AL416264 and 40AL416728

Table 5. Trades and usage for 40AL416264 and 40AL416728 entitlements.

Year	AWD + trade	Usage
14/15	106,036	4,271
15/16	106,036	9,535
16/17	106,036	29,743+2,900
17/18	93,919	7,739
18/19	93,919	Nil to date

Summing usage

Redbank North usage is the sum of 40AL416444, 40AL416264 and 40AL416728, and sums to 106,695.3 megalitres for the six water years from 2012–13 to 2017–18.

Redbank South usage over the same period sums to 81,652 megalitres. Distributing this pro rata annually according to the source of the allocation gives 23,595 megalitres of usage attributable to the Redbank South entitlement.

Expressed as a fraction, Redbank North usage is 81.89%, and Redbank South is 18.11%

The use of this relationship in calculations is risky because there are only five years of records available and the period is marked by large changes to ownership and the trialling of new ways of using entitlements by environmental water holders. This means that any observed behaviours may not be representative of long-term water usage.

Additionally, the period itself is not a representation of the long-term climate, and the observed water use is sensitive to water availability in a period dominated by droughts.

In collaboration with MDBA, it was decided to attempt to verify the fraction relationship using aggregated Cap diversion records (the 'Cap' was 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 period 2006 to 2014, the Cap records showed that 68% went to Redbank North and 32% went to Redbank South. Records after 2014 could not be used as NSW changed the method of reporting data after that date.

The difference between the Cap records and the last five years of recorded use was too high to accept the distribution based on diversions recorded against the entitlements. This resulted in a revision of methodology.

Cap accounting records

The submission to the public consultation process suggested using annual Cap accounting reports, which generally reported separate Redbank North and Redbank South figures. Mr Paul Simpson, a consultant engaged on behalf of the Redbank property owners, identified readily accessible departmental records of take back to 1983.

Mr Simpson is a former river operator in the Murrumbidgee and also played a key role in the preparation of Cap submissions later in his career.

Mr Simpson advised that before the installation of new flow meters, diversions to the Redbank channels were based on regulator opening and height readings, and a set of very old gaugings. The accuracy of the gaugings is unknown. However, a single method had been applied consistently over a very long period, so the relative figures between north and south are consistent. Mr Simpson identified that these records (see Table 6) were the primary source of data and all other data sets are derivative of the operational records.

The records were identical to MDBA-supplied Cap figures from 2006 to 2014, apart from a systematic difference in 2011.

The Cap records were substantially different to the diversions recorded by the supplementary (lowbidgee) entitlements, including frequent recordings of Cap diversion that are completely inconsistent with records of available account water.

Discussion with NSW Office of Environment and Heritage staff confirmed that other Murrumbidgee entitlements are frequently used to deliver water into all three systems: Nimmie-Caira, Redbank South and Redbank North. The Cap records, therefore, contain a mix of environmental and consumptive water use and usage attributable to other forms of entitlement since the purchase of Yanga in 2006. This means that Cap records cannot reliably be used to describe consumptive take after 2006.

Table 6. Historical diversion records for Nimmie-Caira, Redbank North and Redbank South.

Year	Nimmie-Caira	Redbank North	Redbank North (environment)	Redbank South	Redbank Total
1983–84	252386	78495		114635	193130
1984–85	124908	87800		21900	109700
1985–86	244287	94891		87215	182106
1986–87	314950	210900		155190	366090
1987–88	226000	88950		86725	175675
1988–89	321007	169600		71750	241350
1989–90	123565	8500		0	8500
1990–91	147939	25150		0	25150
1991–92	234344	118100		57300	175400
1992–93	377516	116430		82822	199252
1993–94	286898	40000		37000	77000
1994–95	121460	0		0	0
1995–96	188812	73710		47400	121110
1996–97	348117	missing		missing	286400
1997–98	85250	missing		missing	75000
1998–99	253997	82705		85370	168075
1999–00	105237	43500		43500	87000
2000–01	307763	136957		142247	279204
2001–02	96510	missing		missing	31700
2002–03	30845	missing		missing	34180
2003–04	56400	36200		0	36200
2004–05	35518	23470		23938	47408
2005–06	122671	49790		75662	125452
2006–07	2105	0	0	0	0
2007–08	10281	0	0	3777	3777
2008–09	0	0	0	0	0
2009–10	41236	13120	0	7197	20317
2010–11	405815	72695	11400	49532	133627
2011–12	96327	14900	0	0	14900
2012–13	154382	20004	0	0	20004
2013–14	139157	86805	0	30934	117739
2014–15	84710	N/A	N/A	N/A	24339
2015–16	N/A	N/A	N/A	N/A	N/A

A new method

LTDLE factors are designed to describe the expected reduction in consumptive water use that will occur through the recovery of an entitlement. In the case of Redbank North, Redbank South and Nimmie-Caira, the environmental recovery commenced in 2006 with the creation of Yanga National Park.

Since then, the proportion of environmental and consumptive usage has progressively shifted. The usage by environmentally held entitlements is not representative of how those entitlements would have been used if they had been issued to consumptive water users. Historical usage against entitlements is not recorded during a period of exclusive consumptive water use because the entitlements were issued in 2012, well after environmental recovery commenced.

The entitlements were issued to recognise the past history of usage outside the entitlement framework. Cap records from 1983 to 2006, representing the start of the available data records up until the purchase of Yanga, are a period where all recorded take was for consumptive purposes. It would be consistent with the purpose of LTDLE factors to derive the north/south split using this older diversion data.

A simple comparison of the average Redbank Cap diversion of 105,618 megalitres per year to the modelled long-term average diversion of 105,022 megalitres per year strongly suggests that the older diversion records are applicable and representative.

Resultant LTDLE factors

The ratio of summed annual diversions for Redbank North and South in table 6 from 1983 to 2006 shows that 56.73% of diversions go to Redbank North and 43.27% go to Redbank South. This relationship is adopted to calculate Redbank LTDLE factors.

105,022 megalitres of long-term average usage for the combined Redbank is split according to the fractions above. When divided by 2009 BDL entitlements of 213,499 megalitres for Redbank North and 152,501 megalitres for Redbank South, this give factors of 0.2791 and 0.2980 respectively.