



Licence WU67 Monthly Environmental Flow Report December 2022

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1. Introduction

Icon Water holds a Licence to Take Water under the Water Resources Act 2007 – Licence Number WU67.

Under Licence Number WU67 clause C1, it is a requirement to provide the following information to the Environment Protection Authority (EPA) by the 15th day of each month.

2. Compliance Analysis and Operational Interactions

Table 1 - Notes relating to the reporting month Environmental Flow releases

Reservoir	Notes
Corin	<p>Corin Dam spilled throughout December.</p> <p>Planned release variation was changed to +/-25% on 20 September to minimise dislodgement of Macquarie Perch eggs in downstream reaches.</p> <p>Releases were at licence requirements throughout December.</p> <p>The bi-monthly riffle release was achieved from spillway flows.</p>
Bendora	<p>Bendora Dam spilled throughout December.</p> <p>Planned release variation was changed to +/-25% on 20 September to minimise dislodgement of Macquarie Perch eggs in downstream reaches.</p> <p>Releases were at licence requirements throughout December.</p> <p>The bi-monthly riffle release was achieved from spillway flows.</p>
Cotter	<p>Cotter Dam spilled throughout December.</p> <p>Releases were at licence requirements throughout December.</p>
Googong	<p>Googong Dam spilled throughout December.</p> <p>The Googong mini-hydro generator operated for the majority of December.</p> <p>Releases above licence requirements while the mini-hydro was operating. Releases were at licence requirements when the min-hydro was not operating.</p>

Table 2 – Notes relating to abstraction from Murrumbidgee River

Mt MacDonald river gauge	Not applicable, natural river flows.
Murrumbidgee abstraction	There was no Murrumbidgee River abstraction for consumption in December.
Murrumbidgee To Cotter Eflow	M2C did not operate in December.
Murrumbidgee to Googong	M2G did not operate in December
Angle Crossing river gauge	Not applicable, natural river flows.

3. Environmental Release Data

The environmental flow release requirements for the current month (a combination of requirements) are detailed in Table 3.

Table 3 – Current month Environmental Flow releases (Total for month in ML)

	Corin	Bendora	Cotter	Googong
Previous month's shortfall (-) or Excess (+) *	46.5	71.3		
Monthly 75% of the 80 th %tile ML #	465	713		
Additional release required?	No	No	No	No
Current month's release target	418.5	641.7	550	400

Note: * Excess carried forward is capped at 10% of the current month's base flow.

Shortfall carried forward is 100% of the amount of water under released.

Under stage 1 or greater water restrictions, targets flow change to a predetermined base flow.

Daily totals in Table 4 to Table 7 are reported as the 24-hour average from midnight to midnight. Operational changes to environmental flow releases occur during business hours, and therefore the value reported may be slightly different to the target flow on the day the flow is changed. This is particularly evident for large changes in flow e.g. the riffle and pool flushes as the flow is averaged for the day.

The actual daily flows, in megalitres per day (ML/d), from each reservoir are detailed in Table 4 to Table 7 together with the water produced at the water treatment plants (WTP) in Table 10.

Table 8 provides more detail with respect to environmental flows provided below Cotter Dam. The e-flows are made up of two components: water released from the Cotter Dam and water being pumped from Murrumbidgee River to below Cotter Dam. This is to satisfy the requirements set out by ACT EPA and Federal Department of the Environment for the operation of the Enlarged Cotter Dam.

Table 9 provides flow details for the operations of the Murrumbidgee to Googong pipeline. It details daily flows through the high lift pumps station as well as daily flows in the Murrumbidgee River at Angle crossing. This is to demonstrate compliance with the requirements set out by ACT EPA, Federal Department of the Environment and NSW Department of Planning.

Table 10 also details the quantity of treated water that has been transferred to Googong reservoir from Stromlo WTP.

Table 4 - Monthly Environmental Flow release data for Corin dam

SUM	410730 Gingera	410730 Gingera	Environmental flow release below Corin Date	Daily base flow	Additional release (pool / riffle)	Planned +/- 50% release regime	Calculated Natural Flow. (Unverified)	Calculated Natural Flow. (Verified)	Adjusted daily base flow. EOM = Revised monthly target	410752 Corin D/S	410752 Corin D/S	EOM Excess (+) / Shortfall (-) to carry forward	EOM Correction to 410730, Verified Vs unverified	EOM Correction to 410752, Verified Vs unverified	Comments	
	(unverified)	(verified)								(Unverified)	(Verified)					
Previous months adjustment									-80.6							
	288.51	282.6	Thu 1-Dec-22	26.00			32.5	412.1	403.6	26.0	354.80	354			410752 Rating Table Not Available	
	265.34	278.7	Fri 2-Dec-22	26.00			32.5	379.0	398.1	26.0	357.22	354.1			410752 Rating Table Not Available	
	235.33	238.9	Sat 3-Dec-22	26.00			32.5	336.1	341.2	26.0	333.99	330.6				
	223.71	225.7	Sun 4-Dec-22	26.00			32.5	319.5	322.4	26.0	316.34	310.2				
	215.9	217	Mon 5-Dec-22	26.00			32.5	308.4	309.9	26.0	306.9	299.2				
	207.3	209.9	Tue 6-Dec-22	26.00			32.5	296.1	299.8	26.0	272.3	280.7				
	220.7	199.3	Wed 7-Dec-22	26.00			32.5	315.2	284.7	26.0	244.6	253.8				
	216.5	239.1	Thu 8-Dec-22	26.00			19.5	309.3	341.5	26.0	263.5	272				
	188.44	191.1	Fri 9-Dec-22	26.00			19.5	269.1	272.9	26.0	229.79	235.3				
	178.34	180.1	Sat 10-Dec-22	26.00			19.5	254.7	257.2	26.0	214.92	218.6				
	175.31	172.6	Sun 11-Dec-22	26.00			19.5	250.4	246.5	26.0	209.1	212.9				
	402.14	369.5	Mon 12-Dec-22	26.00			19.5	574.4	527.8	26.0	371.1	391.4				
	242.93	268.3	Tue 13-Dec-22	26.00			19.5	347.0	383.2	26.0	376.5	376.5				
	213.51	216.5	Wed 14-Dec-22	26.00			19.5	305.0	309.2	26.0	293.4	285.9				
	193.23	198	Thu 15-Dec-22	26.00	150		32.5	276.0	282.8	150.0	258.9	258.6				
	178.39	180.9	Fri 16-Dec-22	26.00	150		32.5	254.8	258.4	150.0	221.9	221.9				
	167.54	169.8	Sat 17-Dec-22	26.00	150		32.5	239.3	242.5	150.0	199.7	199.7			Riffle release achieved	
	159.30	160.8	Sun 18-Dec-22	26.00			32.5	227.5	229.7	26.0	195.93	195.9				
	151.09	152.8	Mon 19-Dec-22	26.00			32.5	215.8	218.2	26.0	184.00	184				
	146.01	147	Tue 20-Dec-22	26.00			32.5	208.5	210.0	26.0	176.22	176.2				
	143.56	143.6	Wed 21-Dec-22	26.00			32.5	205.0	205.1	26.0	175.76	175.8				
	175.03	168.5	Thu 22-Dec-22	26.00			19.5	250.0	240.7	26.0	206.85	206.8				
	151.95	158.2	Fri 23-Dec-22	26.00			19.5	217.0	226.0	26.0	210.41	210.4				
	136.02	138.6	Sat 24-Dec-22	26.00			19.5	194.3	198.0	26.0	186.45	186.5				
	126.94	128.5	Sun 25-Dec-22	26.00			19.5	181.3	183.5	26.0	168.94	168.9				
	131.96	128.2	Mon 26-Dec-22	26.00			19.5	188.5	183.1	26.0	160.47	160.5				
	125.66	130.5	Tue 27-Dec-22	26.00			19.5	179.5	186.4	26.0	158.88	160.9				
	115.31	116.3	Wed 28-Dec-22	26.00			19.5	164.7	166.1	26.0	147.19	148.9				
	160.38	134	Thu 29-Dec-22	26.00			32.5	229.1	191.4	26.0	132.91	155.3				
	151.85	172.8	Fri 30-Dec-22	26.00			32.5	216.9	246.8	26.0	153.41	197.2				
	145.11	141.1	Sat 31-Dec-22	26.00			32.5	207.3	201.5	26.0	171.46	183.6				
SUM	5,833.27	5858.9		806.0	450.0	825.5	8331.7	8368.3	1097.4		7253.9	7366.3	46.5	0.4%	1.6%	

Table 5 - Monthly Environmental Flow release data for Bendora dam

SUM	410730 Gingera (unverified)	410730 Gingera (verified)	Environmental flow release below Bendora Date	Daily base flow	Additional release (pool / riffle)	Planned +/- 50% release regime	Calculated Natural Flow. (Unverified)	Calculated Natural Flow. (Verified)	Adjusted daily base flow. EOM = Revised monthly target	410747 Bendora D/S (Unverified)	410747 Bendora D/S (Verified)	EOM Excess (+) / Shortfall (-) to carry forward	EOM Correction to 410730 , Verified Vs unverified	EOM Correction to 410747 , Verified Vs unverified	Comments
Previous months adjustment									-127.1						
	288.51	282.6	Thu 1-Dec-22	41.00		51.3	634.7	621.7	41.0	326.10	360.7				
	265.34	278.7	Fri 2-Dec-22	41.00		51.3	583.7	613.1	41.0	333.89	363.4				
	235.33	238.9	Sat 3-Dec-22	41.00		51.3	517.7	525.6	41.0	327.71	363.7				
	223.71	225.7	Sun 4-Dec-22	41.00		51.3	492.2	496.5	41.0	296.79	330.8				
	215.9	217	Mon 5-Dec-22	41.00		51.3	475.0	477.4	41.0	254.5	289				
	207.3	209.9	Tue 6-Dec-22	41.00		51.3	456.1	461.8	41.0	254.6	258.4				
	220.7	199.3	Wed 7-Dec-22	41.00		30.8	485.4	438.5	41.0	228.3	232.2				
	216.5	239.1	Thu 8-Dec-22	41.00		30.8	476.4	526.0	41.0	237.0	238.7				
	188.44	191.1	Fri 9-Dec-22	41.00		30.8	414.6	420.4	41.0	225.51	227.1				
	178.34	180.1	Sat 10-Dec-22	41.00		30.8	392.3	396.2	41.0	198.40	203.3				
	175.31	172.6	Sun 11-Dec-22	41.00		30.8	385.7	379.7	41.0	182.8	188.3				
	402.14	369.5	Mon 12-Dec-22	41.00		30.8	884.7	812.9	41.0	304.2	302.1				
	242.93	268.3	Tue 13-Dec-22	41.00		30.8	534.4	590.3	41.0	455.3	440.7				
	213.51	216.5	Wed 14-Dec-22	41.00	150	51.3	469.7	476.3	150.0	359.6	350.4				
	193.23	198	Thu 15-Dec-22	41.00	150	51.3	425.1	435.6	150.0	294.7	290.6				
	178.39	180.9	Fri 16-Dec-22	41.00	150	51.3	392.5	398.0	150.0	233.1	232.8				Riffle release achieved
	167.54	169.8	Sat 17-Dec-22	41.00		51.3	368.6	373.6	41.0	173.8	176.4				
	159.30	160.8	Sun 18-Dec-22	41.00		51.3	350.5	353.8	41.0	146.35	150.9				
	151.09	152.8	Mon 19-Dec-22	41.00		51.3	332.4	336.2	41.0	127.71	133.9				
	146.01	147	Tue 20-Dec-22	41.00		51.3	321.2	323.4	41.0	114.14	119.5				
	143.56	143.6	Wed 21-Dec-22	41.00		30.8	315.8	315.9	41.0	105.54	111.3				
	175.03	168.5	Thu 22-Dec-22	41.00		30.8	385.1	370.7	41.0	127.69	132.4				
	151.95	158.2	Fri 23-Dec-22	41.00		30.8	334.3	348.0	41.0	182.64	188.8				
	136.02	138.6	Sat 24-Dec-22	41.00		30.8	299.3	304.9	41.0	154.48	161.1				
	126.94	128.5	Sun 25-Dec-22	41.00		30.8	279.3	282.7	41.0	116.06	122.9				
	131.96	128.2	Mon 26-Dec-22	41.00		30.8	290.3	282.0	41.0	90.87	96.32				
	125.66	130.5	Tue 27-Dec-22	41.00		30.8	276.4	287.1	41.0	87.00	93.78				
	115.31	116.3	Wed 28-Dec-22	41.00		51.3	253.7	255.9	41.0	76.54	83.33				
	160.38	134	Thu 29-Dec-22	41.00		51.3	352.8	294.8	41.0	68.01	74.43				
	151.85	172.8	Fri 30-Dec-22	41.00		51.3	334.1	380.2	41.0	110.91	115.6				
	145.11	141.1	Sat 31-Dec-22	41.00		51.3	319.2	310.4	41.0	127.07	133.2				
SUM	5,833.27	5858.9		1271.0	450.0	1301.8	12833.2	12889.6	1470.9	6321.2	6566.1	71.3	0.4%	3.9%	

Table 6 - Monthly Environmental Flow release data for Cotter dam

SUM	Environmental flow release below Cotter Date	Daily base flow	Additional release (pool / riffle)				EOM = Revised monthly target	410700 Cotter D/S (Unverified)	410700 Cotter D/S (Verified)	EOM Excess (+) / Shortfall (-)	EOM Correction to 410700 , Verified Vs unverified	Comments
	Previous months adjustment						0.0					
	Thu 1-Dec-22	15					15.0	525.8	502.2			
	Fri 2-Dec-22	15					15.0	500.1	479.8			
	Sat 3-Dec-22	15					15.0	504.6	480.6			
	Sun 4-Dec-22	15					15.0	473.9	454.9			
	Mon 5-Dec-22	15					15.0	428.2	416.5			
	Tue 6-Dec-22	15					15.0	378.1	371			
	Wed 7-Dec-22	15					15.0	337.4	351.4			
	Thu 8-Dec-22	15					15.0	315.7	324.3			
	Fri 9-Dec-22	15					15.0	296.7	309.9			
	Sat 10-Dec-22	15					15.0	272.8	286.6			
	Sun 11-Dec-22	15					15.0	257.6	270.7			
	Mon 12-Dec-22	15					15.0	339.9	363.8			
	Tue 13-Dec-22	15					15.0	435.5	455.0			
	Wed 14-Dec-22	15					15.0	426.7	441.9			
	Thu 15-Dec-22	15					15.0	361.0	372.8			
	Fri 16-Dec-22	15					15.0	323.7	334.4			
	Sat 17-Dec-22	15					15.0	275.7	285.7			
	Sun 18-Dec-22	15					15.0	230.5	241.5			
	Mon 19-Dec-22	15					15.0	201.3	212.7			
	Tue 20-Dec-22	15					15.0	184.6	196.2			
	Wed 21-Dec-22	15					15.0	172.1	183.9			
	Thu 22-Dec-22	15					15.0	182.8	195.9			
	Fri 23-Dec-22	15					15.0	221.3	236.6			
	Sat 24-Dec-22	15					15.0	233.58	250			
	Sun 25-Dec-22	15					15.0	200.72	217.3			
	Mon 26-Dec-22	15					15.0	169.93	184.7			
	Tue 27-Dec-22	15					15.0	158.88	174.2			
	Wed 28-Dec-22	15					15.0	147.19	162.8			
	Thu 29-Dec-22	15					15.0	132.91	149.1			
	Fri 30-Dec-22	15					15.0	153.41	170.8			
	Sat 31-Dec-22	15					15.0	171.5	191.7			
SUM		465.0	0.0				465.0	9014.2	9268.9	8803.9	2.8%	

Table 7 - Monthly Environmental Flow release data for Googong dam

SUM	410781 Upstream Googong (Unverified)	410781 Upstream Googong (Verified)	Environmental flow release below Googong Date	Daily base flow	Additional release (pool / riffle)	Calculated Natural Flow. (Unverified)	Calculated Natural Flow. (Verified)	EOM = Revised monthly target	410760 Wickerslac (Unverified)	410760 Wickerslac (Verified)	EOM Excess (+) / Shortfall (-)	EOM Correction to 410781 , Verified Vs unverified	EOM Correction to 410760 , Verified Vs unverified	Comments
Previous months adjustment														
	227.4		Thu 1-Dec-22	10.0		291.0		10.0	525.82	226.4				
	225.4		Fri 2-Dec-22	10.0		288.5		10.0	500.14	264				
	221.4		Sat 3-Dec-22	10.0		283.4		10.0	504.61	261.2				
	211.2		Sun 4-Dec-22	10.0		270.3		10.0	473.9	237.3				
	199.6		Mon 5-Dec-22	10.0		255.5		10.0	428.2	218.9				
	193.5		Tue 6-Dec-22	10.0		247.6		10.0	378.1	208.3				
	187.8		Wed 7-Dec-22	10.0		240.4		10.0	337.4	185.1				
	186.0		Thu 8-Dec-22	10.0		238.1		10.0	315.7	193.8				
	172.36		Fri 9-Dec-22	10.0		220.6		10.0	296.7	181.6				
	165.27		Sat 10-Dec-22	10.0		211.5		10.0	272.8	162.1				
	163.6		Sun 11-Dec-22	10.0		209.4		10.0	257.6	152.5				
	260.4		Mon 12-Dec-22	10.0		333.4		10.0	339.9	216.2				
	320.8		Tue 13-Dec-22	10.0		410.7		10.0	435.5	270.8				
	231.5		Wed 14-Dec-22	10.0		296.3		10.0	426.7	276.3				
	185.3		Thu 15-Dec-22	10.0		237.2		10.0	361.00	283.6				
	177.8		Fri 16-Dec-22	10.0		227.6		10.0	323.66	219.9				
	167.2		Sat 17-Dec-22	10.0		214.0		10.0	275.66	174.8				
	161.16		Sun 18-Dec-22	10.0		206.3		10.0	230.54	182.4				
	149.95		Mon 19-Dec-22	10.0		191.9		10.0	201.34	163.1				
	142.25		Tue 20-Dec-22	10.0		182.1		10.0	139.57	139.6				
	136.13		Wed 21-Dec-22	10.0		174.2		10.0	128.33	128.3				
	144.74		Thu 22-Dec-22	10.0		185.3		10.0	130.15	130.2				
	160.27		Fri 23-Dec-22	10.0		205.2		10.0	132.07	132.1				
	156.20		Sat 24-Dec-22	10.0		199.9		10.0	133.10	133.1				
	142.00		Sun 25-Dec-22	10.0		181.8		10.0	137.34	137.3				
	131.60		Mon 26-Dec-22	10.0		168.4		10.0	154.82	154.8				
	179.02		Tue 27-Dec-22	10.0		229.1		10.0	142.85	142.9				
	148.20		Wed 28-Dec-22	10.0		189.7		10.0	139.00	139				
	127.50		Thu 29-Dec-22	10.0		163.2		10.0	144.27	143.3				
	130.12		Fri 30-Dec-22	10.0		166.6		10.0	144.15	143.7				
	129.64		Sat 31-Dec-22	10.0		165.9		10.0	131.01	129.9				
SUM	5535.4	0.0		310.0	0.0	7085.3	0.0	310.0	8542.0	5732.5	5422.5	-100.0%	-32.9%	

Note:

410781 Upstream Googong verified data is provided every second month.

Table 8 – Monthly flow data for Cotter River Environmental Flows

Date	Cotter River e-flows below Cotter Dam		Comments
	E-flow sourced from Murrumbidgee via M2C	E-flow sourced from Cotter Dam release/spill	
Thu 1-Dec-22	0		
Fri 2-Dec-22	0		
Sat 3-Dec-22	0		
Sun 4-Dec-22	0		
Mon 5-Dec-22	0		
Tue 6-Dec-22	0		
Wed 7-Dec-22	0		
Thu 8-Dec-22	0		
Fri 9-Dec-22	0		
Sat 10-Dec-22	0		
Sun 11-Dec-22	0		
Mon 12-Dec-22	0		
Tue 13-Dec-22	0		
Wed 14-Dec-22	0		
Thu 15-Dec-22	0		
Fri 16-Dec-22	0		
Sat 17-Dec-22	0		
Sun 18-Dec-22	0		
Mon 19-Dec-22	0		
Tue 20-Dec-22	0		
Wed 21-Dec-22	0		
Thu 22-Dec-22	0		
Fri 23-Dec-22	0		
Sat 24-Dec-22	0		
Sun 25-Dec-22	0		
Mon 26-Dec-22	0		
Tue 27-Dec-22	0		
Wed 28-Dec-22	0		
Thu 29-Dec-22	0		
Fri 30-Dec-22	0		
Total	0.0		

Table 9 – Monthly flow data for Murrumbidgee to Googong

Date	M2G Flow	Comments
Thu 1-Dec-22	0.0	
Fri 2-Dec-22	0.0	
Sat 3-Dec-22	0.0	
Sun 4-Dec-22	0.0	
Mon 5-Dec-22	0.0	
Tue 6-Dec-22	0.0	
Wed 7-Dec-22	0.0	
Thu 8-Dec-22	0.0	
Fri 9-Dec-22	0.0	
Sat 10-Dec-22	0.0	
Sun 11-Dec-22	0.0	
Mon 12-Dec-22	0.0	
Tue 13-Dec-22	0.0	
Wed 14-Dec-22	0.0	
Thu 15-Dec-22	0.0	
Fri 16-Dec-22	0.0	
Sat 17-Dec-22	0.0	
Sun 18-Dec-22	0.0	
Mon 19-Dec-22	0.0	
Tue 20-Dec-22	0.0	
Wed 21-Dec-22	0.0	
Thu 22-Dec-22	0.0	
Fri 23-Dec-22	0.0	
Sat 24-Dec-22	0.0	
Sun 25-Dec-22	0.0	
Mon 26-Dec-22	0.0	
Tue 27-Dec-22	0.0	
Wed 28-Dec-22	0.0	
Thu 29-Dec-22	0.0	
Fri 30-Dec-22	0.0	
Total	0.0	

Table 10 – Monthly water production data and water transferred to Googong reservoir

Day	Stromlo WTP ML			Googong WTP ML	Transfer from SWTP to Googong res.
	M'bidgee	Cotter	Bendora		
1	0.0	0.0	142.5	0.0	0.0
2	0.0	0.0	149.4	0.0	0.0
3	0.0	0.0	132.3	0.0	0.0
4	0.0	0.0	122.9	0.0	0.0
5	0.0	0.0	147.7	0.0	0.0
6	0.0	0.0	160.7	0.0	0.0
7	0.0	0.0	173.0	0.0	0.0
8	0.0	0.0	165.3	0.0	0.0
9	0.0	0.0	164.9	0.0	0.0
10	0.0	0.0	164.9	0.0	0.0
11	0.0	0.0	159.5	0.0	0.0
12	0.0	0.0	160.9	0.0	0.0
13	0.0	0.0	147.0	0.0	0.0
14	0.0	0.0	127.9	0.0	0.0
15	0.0	0.0	124.5	0.0	0.0
16	0.0	0.0	135.5	0.0	0.0
17	0.0	0.0	154.1	0.0	0.0
18	0.0	0.0	159.6	0.0	0.0
19	0.0	0.0	164.2	0.0	0.0
20	0.0	0.0	157.2	0.0	0.0
21	0.0	0.0	166.4	0.0	0.0
22	0.0	0.0	159.9	0.0	0.0
23	0.0	0.0	144.9	0.0	0.0
24	0.0	0.0	141.3	0.0	0.0
25	0.0	0.0	148.4	0.0	0.0
26	0.0	0.0	164.7	0.0	0.0
27	0.0	0.0	165.1	0.0	0.0
28	0.0	0.0	160.3	0.0	0.0
29	0.0	0.0	165.9	0.0	0.0
30	0.0	0.0	172.3	0.0	0.0
31	0.0	0.0	150.0	0.0	0.0
Total	0.0	0.0	4753.2	0.0	0.0

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