WATER AUDIT OF THE SOUTH ESK BASIN AND AN ASSESSMENT OF PROPOSED PULP MILL REQUIREMENTS

Briefing paper

This paper was produced for the purpose of promoting informed debate on the availability of water during the dry summer months at the bottom of the South Esk Basin for Gunns' proposed pulp mill and existing consumers.

M Cassidy BSc (Hons) MA (STS)

Summary

A water audit of inputs and outputs from the South Esk basin over the summer period of 2006-07 unveils a story of declining supplies and increasing demands.

The audit highlights a covert competition for water security involving Meander valley irrigators; Midlands farmers; domestic consumers in Campbell Town, Ross and Tunbridge; domestic consumers supplied by Esk Water; environmental flows to sustain river health; consumption by expanding plantations in the headwaters; and direct use by the proposed pulp mill.

It makes sense to consider current and future needs of water users and the capacity of the basin to meet those needs over not just one summer but several decades. A decision to proceed with the proposed pulp mill also entails further changes in land use to plantations to feed it and will lock in patterns of water consumption for decades at a time of climate change.

The main conclusions are that:

1. Although the government has a stated aim of achieving equitable, efficient and sustainable allocation and use of water resources, there appears to be no water audit of the South Esk basin nor a means for making decisions for the long term in a holistic equitable manner;
2. There is a strong case that even before a pulp mill is built, the needs of existing users will not be met from the South Esk River during the driest months in future years;
3. Downstream users of water in the South Esk River are effectively subsidising the plantation owners for the water they use from the headwaters;
4. The proposed pulp mill will depend on water transfers (environmental flows) from the Meander dam during the driest months of the year;
5. The asking price for water entitlements and terms of payment that are currently being offered to farmers in the Meander valley means that irrigators of the Meander valley will be effectively subsidising Gunns' pulp mill for the water to be used from Lake Trevallyn.

Issues raised

- Is the government taking a long term whole-of-catchment approach to the South Esk water allocation question?
- Who gets priority access to water particularly during the summer?
- Is there a level playing field in the water market? Water consumption by plantations is unmetered and uncosted; Gunns are to pay $24-28/Megalitre (ML) for direct use by the pulp mill (Hydro FOI letter 17/5/07); Midlands farmers to pay $200/ML (Examiner 31/5/07); Meander irrigators $115-123/ML or $1000 capital contribution and annual supply charge $35/ML used or not.
- Should the cost of the Meander dam be shared by all the ultimate users of water released from the dam (pulp mill and farmers) instead of only farmers?
- Will Gunns be given preferred access to water over farmers as is happening by default? If so, farm irrigators who have had their allocations for many years could find that they will have restrictions placed on their take during dry periods whilst plantations continue to take water from the system.

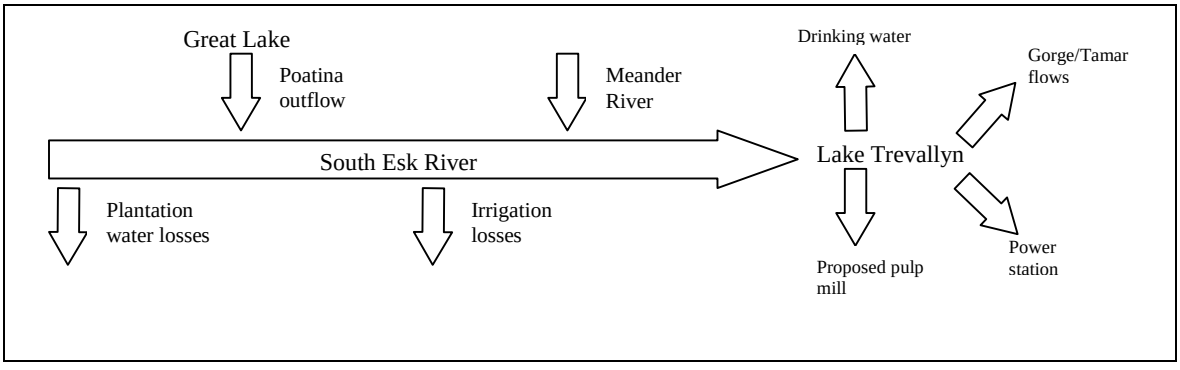
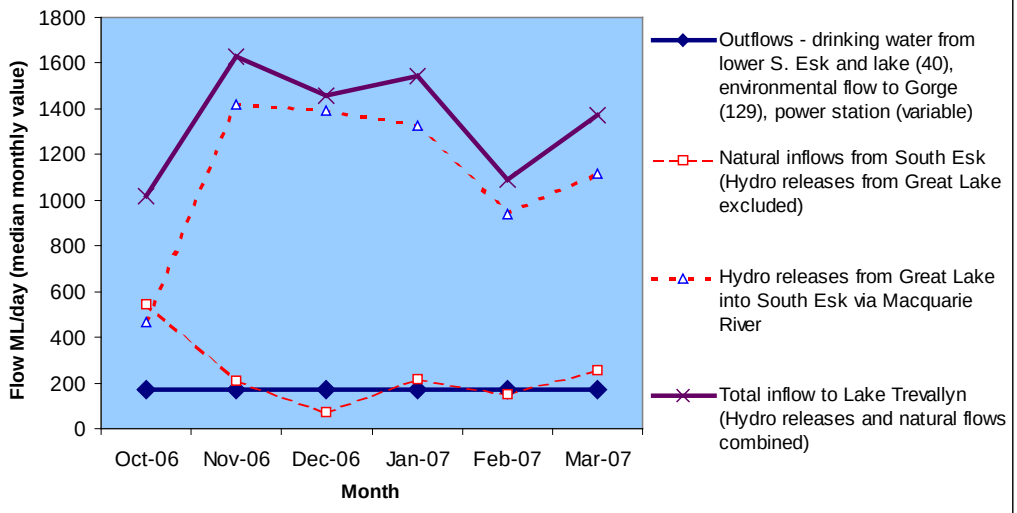


Figure 1. Sources, losses and uses of water from the South Esk River and Lake Trevallyn

Rainfall in the NE highlands upstream of Mathinna supplies most (70%) of the natural flows to the South Esk River (DPIW gauging station data) but by far the majority of water came from Hydro Tasmania releases from Great Lake. Withdrawals occur in the headwaters from plantations and downstream by irrigators and urban consumers. The small holding capacity of Lake Trevallyn means that continuous inputs from the South Esk are essential to meet year round demands. Esk Water draws 40 ML/day (DPIW web site) from the lower South Esk and Lake Trevallyn for distribution to urban consumers; to sustain river health in the Gorge, environmental flows are set at 129 ML/day. Electricity generation occurs if a surplus is available.

Over the period November 2006 to March 2007, natural flows in the South Esk River of around 100 to 200 ML/day (Figure 2) were augmented by artificial flows from operating the Poatina power station (around 1000 to 1400 ML/day). Most of the inflow (82%) to Lake Trevallyn (figure 2) came from Great Lake.

Figure 2. South Esk inflows to Lake Trevallyn Oct 06 to Mar 07 and allocation of outflows. Median monthly values in Megalitres (ML)/day



Hydro releases from Great Lake supplied most of the water to Lake Trevallyn via Brumbys Creek and the Macquarie and South Esk Rivers. Flow data is from Hydro and DPIW gauging stations at Back Creek, Liffey, South Esk, Meander and Macquarie Rivers (at Cressy). A median monthly flow figure represents the typical flow of river water in that month and is distinct from an average flow which can readily be distorted by a short-lived flood event.

It makes sense to consider the needs of water users and the capacity of the system to meet those needs over not just one summer but several decades given the expected life of a pulp mill and the long time required to grow plantations to feed it in an era of climate change.

Future trends of inputs to the South Esk River

Great Lake water levels fell from 19% to only 12% of full capacity (Figure 3) over the 2006/07 summer period. At continuous discharge rates equal to the November 2006 average (1422 ML/day) and in the absence of significant rainfall, Great Lake would empty in under nine months. Hydro Tasmania was forced to stop flows through the Poatina Tailrace into the South Esk from Great Lake when lake levels reached all time lows of around 11-12% (Examiner 30/5/07). The future capacity of Hydro Tasmania to continue releasing water during summer periods at a similar rate appears severely limited without unusual and sustained heavy rainfall to top up Great Lake.

Future flows in the South Esk will also fall due to climate change. An expected 8% decline in rainfall from climate change (CSIRO/Hydro study 2006) are expected to reduce South Esk River flows by around 15% (based on Prof Mike Young's comments re larger than expected fall in river flow resulting from decline in rainfall).

Flows will decline further due to expanding tree plantation estates in the headwaters of the South Esk which covered 15561 ha in 2004/2005 (Private Forests Tasmania). The rapidly growing trees will consume up to 31Gigalitres/year (GL/yr) or 85 ML/day over and above native forests as they mature (TasLUCaS model). Plantations in headwaters get first access and downstream users get unused water that eventually enters the river. The estimates of water removed from the South Esk are likely to be conservative as the plantation area state-wide grew 26% in 2006 (National Plantation Inventory 2007 Update). Downstream users are effectively subsidising plantation owners for the water they use. For an outline of the implications of water consumption by plantations, see Fact sheet #7 'Is there enough water for a Tamar valley pulp mill?' available at www.tapvision.info, under section on Fact Sheets and Analysis.

Low summer flows have already led to blue green algal blooms which compromised drinking water quality and recreational use of the South Esk.

In summary, there is a strong case that existing needs will not be met from the South Esk River during the driest months. However, future demands are likely to grow. The State Government is considering diverting up to 50 GL/year of the flow from the Poatina tailrace to supply farmers and towns in the Midlands of Tasmania, further reducing inflows to the South Esk. Costs to users will be around $200/ML (Swain, TFGA, Examiner 25/5/2007).

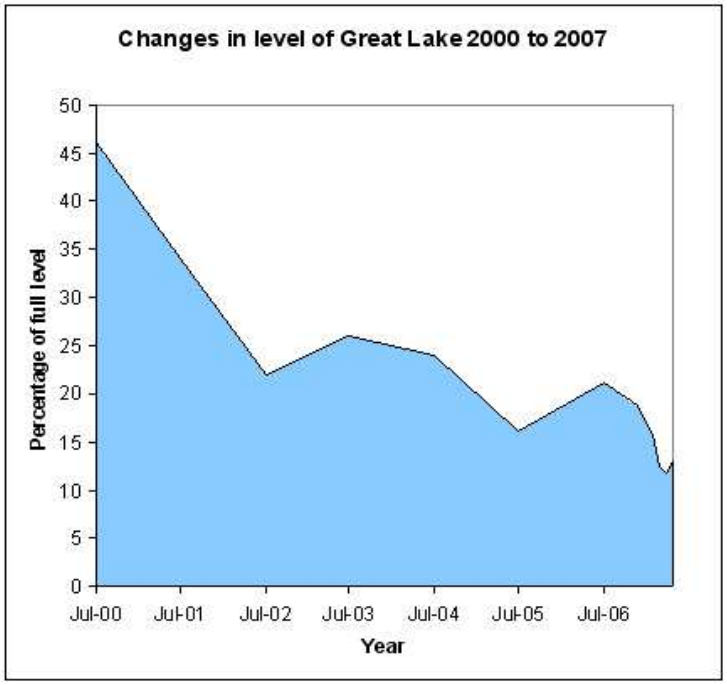


Figure 3. Draw down of Great Lake (2000 – 2007). Levels over the period October 06 to March 07 fell from around 19% to 12%. (Hydro Tasmania annual reports and web updates).

Note: one gigalitre (GL) = 1000 megalitres (ML) = 1000 million litres = 1000 Olympic swimming pools.

Impact of the pulp mill on the South Esk basin water budget

Pulp mills can last around 100 years (as in Europe) so security of water supplies is vital. The mill proposal is to draw up to 40 GL/year from Lake Trevallyn, Launceston or 110 ML every day (Hydro Tasmania FOI letter 17 May 2007).

Given that the South Esk flows vary dramatically from winter to summer, it is more realistic to consider the availability of a continuous supply of water every day through the summer rather than relying on a percentage of annual flow. Gunns' publicity claims less than 2% of the total annual flow.

Had the proposed pulp mill been operating over the October 2006 – March 2007 summer period, it would have consumed 8% of total inflows to Lake Trevallyn or 46% of natural inflows from the South Esk (based on DPIW and Hydro gauging station data).

Releases of water from Great Lake were essential to meet existing needs during December 2006. Without those releases, the projected consumption of the pulp mill by itself would have exceeded natural inflows to Lake Trevallyn and emptied the lake due to its small holding capacity.

Future water supplies for a pulp mill cannot be guaranteed from the South Esk River upstream of the junction with the Meander River

Significance of the Meander dam

The Meander dam started construction in October 2005 and is expected to hold 43 GL (Figure 4). Some 24 GL has been allocated for irrigation but environmental flows allocated to river health have priority ahead of irrigation needs in the event of falling river levels.

Gunns' search for a guaranteed water supply of up to 110ML/day started with the Pipers River and then settled on Lake Trevallyn. The environmental flows released from the Meander dam provide a continuous reliable water supply during critical dry months that does not appear to be available from other sources. In setting a minimum environmental flow of around 100ML/day (DPIW website) it can be argued that the State Government is effecting a water transfer from the dam at the top of the catchment to Gunns at the bottom of the catchment, albeit with benefits for the river health en route.

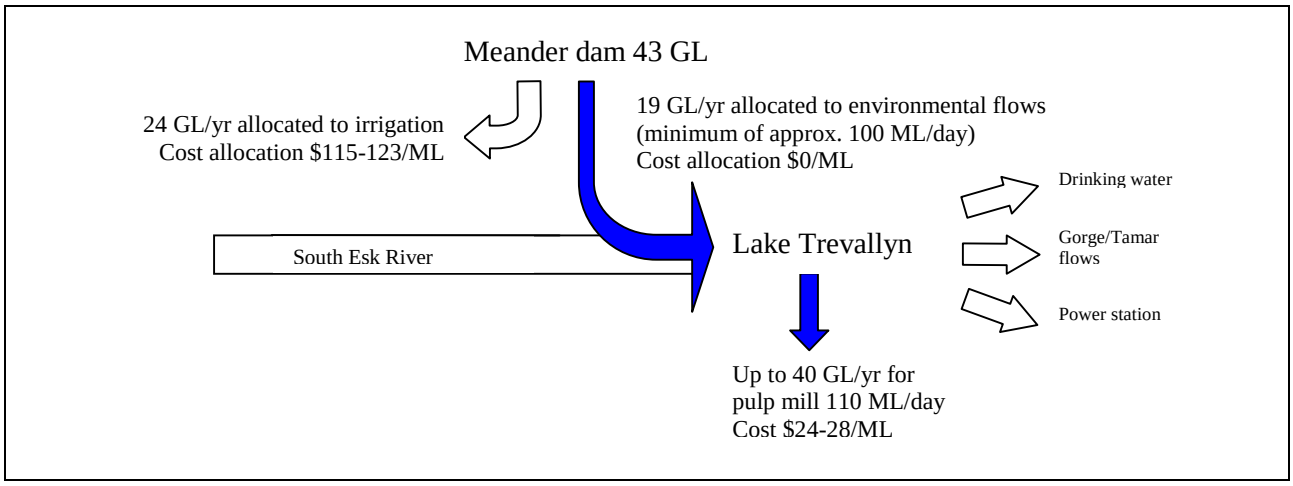


Figure 4. Allocation of Meander dam outflows and costs.

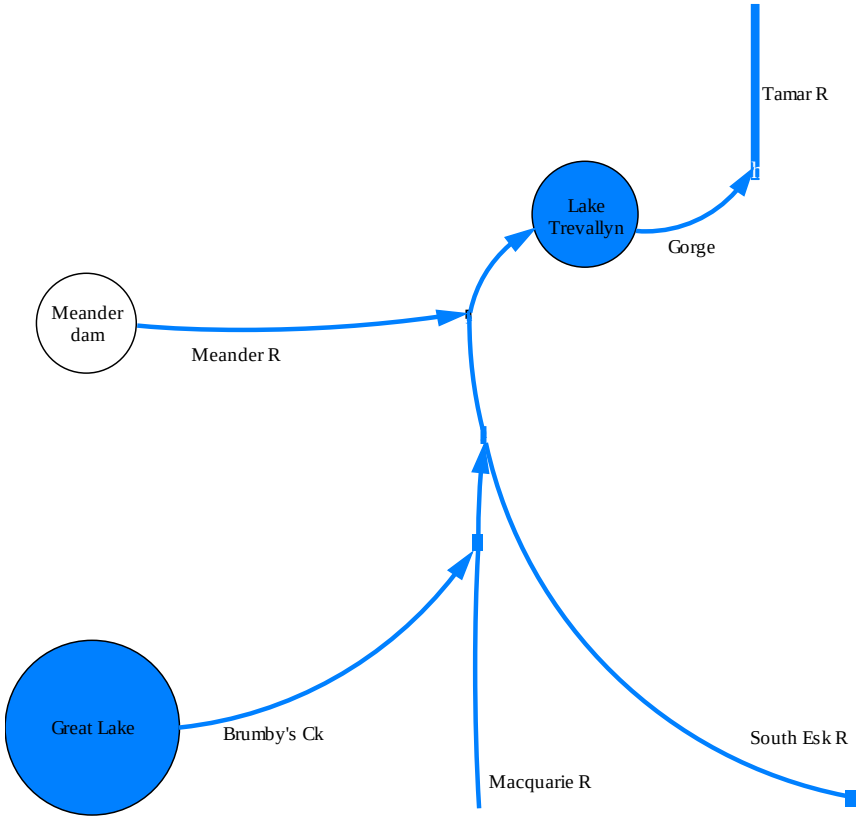
Apart from taxpayer contributions, the cost of the Meander dam is being charged to irrigators ($1000 capital contribution rising to $1100 from July 07 and annual supply charge $35/ML or 115-123/ML whether used or not). The high cost barrier to accessing water for irrigation by farmers has limited the number taking up the option.

Gunns' pulp mill will effectively pick up the environmental flow allocation from the bottom of the catchment after it enters the South Esk River. However, the price charged to Gunns for using water sourced from the dam is based not on a share of the dam costs but on the price of hydro generated electricity foregone from the Trevallyn power station ($24-28/ML, Hydro Tasmania letter released under FOI, 17/5/07). Farmers of the Meander valley are effectively subsidising the pulp mill.

Conclusions

1. Although the government has a stated aim of achieving equitable, efficient and sustainable allocation and use of water resources, there appears to be no audit of water resources of the South Esk basin nor a means for making decisions for the long term in a holistic equitable manner;
2. There is a strong case that existing needs will not be met from the South Esk River during the driest months in future years;
3. Downstream users of water in the South Esk River are effectively subsidising the plantation owners for the water they use from the headwaters;
4. The proposed pulp mill will depend on water transfers (environmental flows) from the Meander dam during the driest months of the year;
5. The asking price for water entitlements and terms of payment that are currently being offered to farmers in the Meander valley means that irrigators of the Meander valley will be effectively subsidising Gunns' pulp mill for the water to be used from Lake Trevallyn.

Appendix 1
Schematic of the South Esk Basin



Appendix 2 Summary Data

Summer 2006-07	Input to Lake Trevallyn ML/day Median value for each month			Projected pulp mill consumption ML/day and % of inflows		
Month	Natural inflows from South Esk (Hydro releases from Great Lake excluded)	Hydro releases from Great Lake into South Esk via Macquarie River	Total inflow (Hydro releases from Great Lake and natural flows combined)	Pulp mill use ML/day	Percentage of total inflow each month	Percentage of natural inflow each month
Oct-06	547	469	1016	110	11	20
Nov-06	209	1422	1631	110	7	53
Dec-06	70	1390	1460	110	8	157
Jan-07	214	1329	1543	110	7	51
Feb-07	151	938	1089	110	10	73
Mar-07	257	1119	1376	110	8	43

Table 1. Data summary showing source of water entering Lake Trevallyn and current allocation of outflows including projected consumption of water by the proposed pulp mill. Data compiled from DPIW and Hydro gauging stations shown in Tables 3 to 8 Appendix 2.

Year	Great Lake % of full level
Jul-00	46
Jul-01	34
Jul-02	22
Jul-03	26
Jul-04	24
Jul-05	16
Jul-06	21
Dec-06	18.7
Feb-07	15.7
Mar-07	12.5
Apr-07	11.7
May-07	12.9

Table 2 shows the draw down of Great Lake as percentage of full level from 2000 to 2007. (Hydro Tasmania annual reports and periodic web updates.)

Appendix 3 Raw Data

Table 3 Raw data for October 2006. Daily averages of stream flow measured in ML/Day

DAY	South Esk above Macquarie No. 181	Meander at Strathbridge No. 852	Back Ck Wilmores Lane No. 18219	Liffey at Carrick No. 164	Total of 4 stations	Hydro releases Macquarie River at Cressy
1	1568.1	934.0	24.3	159.1	2685.5	881.7
2	1275.1	802.4	23.3	131.8	2232.6	735.3
3	840.9	710.0	19.2	104.4	1674.5	652.2
4	725.4	614.4	24.7	80.5	1445.0	605.5
5	638.8	544.6	22.8	70.6	1276.9	668.7
6	596.7	510.0	28.9	74.2	1209.8	727.5
7	757.4	497.8	27.2	65.1	1347.4	511.5
8	729.0	446.7	27.1	54.7	1257.5	469.3
9	675.1	399.1	27.2	50.3	1151.8	444.2
10	607.9	358.8	25.9	42.7	1035.3	395.1
11	536.1	331.5	21.9	36.9	926.3	440.1
12	459.8	308.7	23.3	24.1	816.0	516.8
13	382.7	285.0	25.0	20.0	712.8	435.6
14	341.3	247.8	30.1	17.8	637.1	371.7
15	311.9	225.6	37.2	15.7	590.4	385.3
16	278.3	219.2	35.5	13.8	546.7	860.2
17	253.2	211.7	31.8	14.8	511.6	506.6
18	226.3	206.9	30.4	15.0	478.6	403.7
19	211.5	189.6	34.5	14.6	450.3	344.9
20	199.8	183.3	32.0	9.6	424.8	440.5
21	187.3	157.4	30.6	8.3	383.6	304.7
22	172.3	142.8	34.0	5.7	354.7	310.5
23	183.7	133.6	29.7	9.3	356.3	384.0
24	168.5	120.4	25.0	8.4	322.3	470.3
25	152.6	114.8	33.7	6.6	307.7	468.8
26	148.6	105.6	34.5	9.1	297.9	457.6
27	143.5	94.2	28.7	5.3	271.7	470.6
28	145.8	87.0	35.3	6.1	274.1	467.3
29	143.1	91.0	35.0	8.7	277.8	489.8
30	154.9	97.0	33.3	3.4	288.7	489.1
31	159.7	77.7	28.6	1.1	267.1	394.3
				Medians	546.7	468.8

Table 4 Raw data for November 2006. Daily Averages of Stream Flow Measured in ML/Day

DAY	South Esk above Macquarie No. 181	Meander at Strathbridge No. 852	Back Ck Wilmores Lane No. 18219	Liffey at Carrick No. 164	Total of 4 stations	Hydro releases Macquarie River at Cressy
1	248.7	77.2	28.5	2.4	356.9	519.9
2	8.9	77.9	27.9	8.7	123.4	525.6
3	135.3	83.5	30.7	7.3	256.9	507.5
4	118.7	78.6	29.9	4.0	231.2	482.6
5	116.3	75.9	34.8	3.0	230.0	463.7
6	114.0	64.9	34.1	3.2	216.2	441.8
7	119.6	59.6	34.3	1.2	214.7	456.1
8	128.5	56.4	29.1	5.9	219.8	593.1
9	136.9	63.2	32.1	5.0	237.3	481.3
10	133.1	66.0	30.5	2.4	232.0	980.5
11	113.2	62.0	28.5	5.3	209.0	511.2
12	106.9	56.3	28.2	3.2	194.6	513.9
13	107.1	59.9	40.0	3.1	210.0	937.4
14	120.9	60.4	36.4	5.9	223.6	2047.7
15	124.0	62.9	33.1	5.3	225.3	2188.9
16	140.8	61.1	35.9	4.3	242.1	1671.1
17	146.5	64.3	36.6	2.3	249.7	1892.1
18	139.8	56.7	26.0	1.9	224.3	1800.3
19	134.6	40.4	30.8	1.1	206.9	1172.3
20	131.2	30.3	28.8	0.6	190.9	2053.8
21	116.4	29.5	24.4	0.4	170.6	1985.6
22	96.0	29.0	27.9	0.2	153.1	2409.1
23	81.1	23.6	29.1	5.0	138.8	2674.0
24	66.6	21.0	20.8	5.9	114.3	1864.5
25	60.8	21.5	31.7	2.7	116.7	1968.0
26	56.2	18.8	18.7	2.9	96.6	2069.8
27	52.3	18.9	21.3	4.5	97.0	1938.5
28	50.4	16.1	19.4	4.1	90.0	931.7
29	52.1	15.9	13.5	2.5	83.9	1764.8
30	48.9	11.3	21.6	3.8	85.6	2801.3
				Medians	209.5	1421.7

Table 5 Raw data for December 2006. Daily Averages of Stream Flow Measured in ML/Day

DAY	South Esk above Macquarie No. 181	Meander at Strathbridge No. 852	Back Ck Wilmores Lane No. 18219	Liffey at Carrick No. 164	Total of 4 stations	Hydro releases Macquarie River at Cressy
1	42.4	13.1	22.8	3.2	81.6	2780.2
2	41.1	17.1	21.9	6.5	86.6	2771.5
3	40.7	14.2	20.7	5.3	81.0	3016.9
4	38.3	18.0	26.8	4.6	87.6	1406.9
5	33.8	32.4	21.7	6.4	94.4	1095.6
6	23.6	27.0	16.7	2.4	69.7	1250.9
7	20.2	20.4	21.6	1.9	64.2	1280.7
8	20.3	17.9	19.4	2.8	60.4	1043.9
9	20.6	20.0	24.5	1.5	66.6	1066.3
10	20.9	17.7	24.1	3.0	65.7	2318.1
11	20.9	15.3	18.8	3.8	58.9	2654.8
12	20.6	12.6	15.7	2.3	51.1	3367.0
13	21.4	17.7	15.4	1.2	55.7	3231.1
14	21.4	11.5	19.0	2.6	54.4	3560.1
15	19.7	14.0	25.5	3.1	62.3	3267.4
16	17.9	19.3	19.9	4.1	61.2	2378.9
17	17.6	16.8	30.8	4.0	69.3	2254.1
18	17.8	15.6	39.4	3.1	75.9	1390.5
19	17.0	13.5	27.0	4.0	61.5	1835.8
20	16.0	11.3	22.0	1.3	50.6	1614.2
21	15.5	8.9	18.1	0.7	43.2	1379.1
22	15.1	12.5	32.1	1.8	61.6	1880.8
23	15.9	18.1	55.4	12.9	102.3	1243.4
24	19.0	13.6	66.9	240.2	339.8	1025.2
25	25.4	768.2	57.9	205.9	1057.3	880.2
26	35.0	522.5	52.6	92.4	702.5	848.0
27	44.0	298.7	45.2	44.5	432.3	624.4
28	48.6	181.3	32.3	18.5	280.7	549.3
29	57.7	112.4	26.6	12.5	209.2	843.5
30	55.2	76.9	29.7	2.9	164.8	1116.3
31	48.5	56.1	30.3	4.5	139.4	1147.5
				Medians	69.7	1390.5

Table 6 Raw data for January 2007. Daily Averages of Stream Flow Measured in ML/Day.

DAY	South Esk above Macquarie No. 181	Meander at Strathbridge No. 852	Back Ck Wilmores Lane No. 18219	Liffey at Carrick No. 164	Total of 4 stations	Hydro releases Macquarie River at Cressy
1	47.1	43.8	31.0	4.8	126.8	1171.8
2	45.5	40.0	44.5	6.3	136.4	1127.4
3	43.3	30.4	31.8	10.5	116.0	1097.0
4	40.9	18.4	33.2	5.3	97.7	1463.2
5	37.3	16.6	36.7	5.2	95.8	1958.3
6	36.9	21.4	56.3	10.8	125.4	1630.1
7	41.1	459.6	66.2	194.8	761.7	1794.6
8	44.5	439.5	52.9	304.0	841.0	1295.9
9	52.5	897.2	59.2	134.4	1143.4	890.1
10	145.5	541.6	49.3	82.7	819.2	726.4
11	126.9	364.3	43.3	49.1	583.6	764.8
12	94.3	254.2	37.3	32.3	418.2	1717.4
13	69.3	177.5	44.4	19.6	310.9	2410.5
14	55.9	124.8	42.0	21.6	244.2	1760.0
15	49.2	100.1	49.5	15.0	213.8	756.5
16	43.9	85.4	33.6	9.6	172.5	933.1
17	40.6	64.7	43.5	6.3	155.0	1570.0
18	35.9	51.8	44.2	4.0	135.9	3781.8
19	38.9	51.6	50.0	5.0	145.6	2090.8
20	37.0	43.7	50.0	5.0	135.7	2670.0
21	36.7	40.1	50.0	5.0	131.8	1866.9
22	38.2	49.0	58.1	223.4	368.7	911.1
23	35.9	886.7	56.4	104.0	1083.0	1380.4
24	31.4	522.0	55.8	62.3	671.5	1590.4
25	28.9	350.4	46.8	40.6	466.6	1633.3
26	26.9	235.0	46.7	30.4	339.0	1329.5
27	23.7	175.2	46.7	23.1	268.6	1049.5
28	20.2	131.8	48.3	19.3	219.5	931.2
29	18.1	114.8	41.5	16.8	191.3	905.1
30	16.0	96.5	39.6	13.7	165.8	810.2
31	14.5	74.6	49.7	8.3	147.0	653.0
				Medians	213.8	1329.5

Note; in the absence of actual data for 19-21 January figures for Back Ck and Liffey are interpolated.

Table 7 Raw data for February 2007. Daily Averages of Stream Flow Measured in ML/Day.

DAY	South Esk above Macquarie No. 181	Meander at Strathbridge No. 852	Back Ck Wilmores Lane No. 18219	Liffey at Carrick No. 164	Total of 4 stations	Hydro releases Macquarie River at Cressy
1	12.9	69.8	47.6	5.6	136.9	876.5
2	12.1	48.3	41.1	3.5	107.0	515.2
3	10.9	42.4	34.8	4.3	95.4	469.6
4	10.4	37.7	37.4	2.9	92.4	645.0
5	9.6	30.8	45.8	6.6	97.8	535.5
6	8.6	28.2	41.4	7.0	91.2	2298.6
7	6.8	19.1	37.8	5.7	76.4	1195.3
8	5.5	836.1	40.7	4.7	894.9	464.4
9	4.6	18.7	39.2	2.4	73.9	399.0
10	3.6	22.3	42.4	5.2	83.5	375.7
11	3.1	21.1	54.6	7.3	97.1	360.7
12	2.4	21.2	58.0	6.8	100.4	360.2
13	34.6	26.8	48.4	4.3	127.2	382.5
14	73.3	23.3	46.6	1.4	158.6	422.6
15	63.3	19.5	43.0	1.1	141.8	579.1
16	64.1	16.4	46.1	0.9	143.6	999.9
17	183.9	15.8	41.5	1.0	259.2	1197.3
18	169.5	15.2	46.5	5.3	254.4	1343.4
19	184.7	15.2	51.6	5.0	275.5	1178.2
20	142.2	17.2	50.0	5.0	234.5	1065.4
21	105.4	17.2	50.0	5.0	198.7	1833.7
22	65.4	937.3	39.0	7.9	1071.6	1338.3
23	66.9	29.3	41.5	6.9	167.6	1929.4
24	57.0	221.8	41.7	4.5	349.0	3077.8
25	60.1	192.9	46.0	6.2	330.2	3163.3
26	64.0	107.3	46.1	5.1	248.5	1982.0
27	59.4	75.9	40.3	6.7	209.2	1767.5
28	54.4	55.5	41.9	3.4	183.2	795.5
				Medians	151.1	938.2

Note: in the absence of actual data for 20-21 Feb, figures for Back Ck and Liffey are interpolated.

Table 8 Raw data for March 2007. Daily Averages of Stream Flow Measured in ML/Day.

DAY	South Esk above Macquarie No. 181	Meander at Strathbridge No. 852	Back Ck Wilmores Lane No. 18219	Liffey at Carrick No. 164	Total of 4 stations	Hydro releases Macquarie River at Cressy
1	118.2	46.0	48.9	8.4	221.6	893.3
2	941.8	36.2	56.7	13.7	1048.2	2086.5
3	910.2	25.8	52.2	11.9	1000.1	2375.9
4	717.4	32.0	53.3	8.7	811.4	2244.4
5	Missing	34.3	53.3	8.3	96.0	1779.4
6	Missing	26.5	44.0	9.3	79.9	2217.3
7	Missing	20.9	39.6	8.3	68.8	1595.3
8	938.1	18.0	45.1	6.1	1007.3	1142.0
9	718.2	16.4	57.5	6.6	798.7	757.5
10	554.7	14.1	47.3	6.6	622.7	501.0
11	416.1	11.0	47.4	8.3	482.8	515.1
12	314.4	12.7	39.1	13.1	379.2	418.1
13	251.1	16.6	34.5	8.9	311.0	330.4
14	209.5	20.7	33.2	4.8	268.1	447.7
15	170.3	20.4	42.8	7.3	240.9	954.5
16	148.5	21.4	70.0	9.0	249.0	1118.8
17	132.5	21.5	37.5	5.0	196.4	1967.8
18	131.1	17.1	39.0	3.3	190.4	2399.0
19	130.1	13.6	44.2	6.6	194.4	2344.3
20	98.2	24.4	34.4	5.0	162.0	948.9
21	82.7	24.3	35.7	4.5	147.2	1647.7
22	75.6	24.3	45.7	5.9	151.4	2705.8
23	70.7	21.5	54.9	7.0	154.1	2392.6
24	76.5	23.9	49.8	10.1	160.3	2648.8
25	79.5	20.2	72.0	14.9	186.5	1892.2
26	170.4	21.7	48.6	16.5	257.2	371.4
27	196.3	39.8	51.9	12.7	300.7	578.7
28	159.1	50.7	60.0	11.0	280.8	1076.0
29	154.5	43.8	60.0	13.2	271.5	503.3
30	187.6	117.3	68.3	22.2	395.4	503.3
31	305.9	395.7	57.0	26.5	785.2	664.2
				Medians	257.2	1118.8

Note: in the absence of actual data for 28-29 March figures for Back Ck and Liffey are interpolated.