



Mary Basin

draft water resource plan

hydrology report

Volumes 1 & 2

November 2005



Prepared by

Water Assessment Group

Department of Natural Resources and Mines (Queensland)

This report provides background information on the Mary Basin for the proposed draft Mary Basin Water Resource Plan. The processes referred to in this report are in accordance with the requirements of the Water Act 2000. The information contained in this report should, therefore, be interpreted in that context.

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Volume 1
Mary & Burrum Rivers
IQQM Full and Current Utilisation Assumptions

Volume 1**TABLE OF CONTENTS**

LIST OF TABLES	vi
1 INTRODUCTION.....	1
2 DATA AND DATA SOURCES FOR WATER USERS	1
3 HOW DEMANDS ARE MODELLED FOR EACH USER TYPE	14
3.1 Urban Users	14
3.2 Regulated Users.....	15
3.3 Unregulated Irrigation and Waterharvesting	15
3.4 Stock and Domestic Demands	15
4 ALLOCATION RULES.....	16
4.1 Allocation Model in Use.....	16
4.2 Mary Valley Water Supply Scheme	16
4.3 Lower Mary Water Supply Scheme	17
4.4 Cedar Pocket Water Supply Scheme	18
5 STORAGE DATA.....	19
6 MINIMUM FLOW REQUIREMENTS.....	20
6.1 Gympie.....	20
6.2 Cooroy Weir	20
6.3 Baroon Pocket Dam	20
7 IRRIGATION ORDERS.....	21
7.1 Over Order Factors	21
7.2 Irrigation Order Times	21
8 PUMP STATION CAPACITIES.....	22
9 LOWER MARY IRRIGATION AREA	22
10 NODES WHERE FLOWS ARE TO BE EXTRACTED FROM	23

LIST OF TABLES

Table 2.1	Licence/Node Information Required and Information Sources.....	2
Table 2.2	Mary River Full Utilisation Demands	3
Table 2.3	Burrum River Full Utilization Demands.....	8
Table 2.4	Mary River Current Utilisation Demands	9
Table 3.1	Monthly Patterns for Urban Demand.....	14
Table 3.2	Monthly pattern for Regulated Irrigation Demand.....	15
Table 4.1	Mary Valley Water Supply Scheme Minimum Inflows.....	17
Table 4.2	Lower Mary Water Supply Scheme Minimum Inflows.....	18
Table 5.1	Storage Details	19
Table 6.1	Baroon Pocket Dam Compensation Release.....	20
Table 7.1	Order Times	21
Table 10.1	Mary River Nodes where Flow Data Will be Reported	23
Table 10.2	Burrum River Nodes where Flow Data Will be Reported	23

1 INTRODUCTION

This document outlines the assumptions and information being used in scenario modelling for the Mary River WRP Study. Daily flow models have been developed for the Mary River Basin and the Burrum River Basin using the Integrated Quality Quantity Model (IQQM) developed by the Department of Land and Water Conservation in New South Wales.

This model includes the Mary River and its tributaries from its headwater to the river mouth.

The Burrum River model includes the Burrum River and its tributaries and a smaller submodel of the Beelbi Creek system.

2 DATA AND DATA SOURCES FOR WATER USERS

This section presents the information used to model various types of water use within each Basin. Licence information has been collated by the Regional Office, based on the Water Entitlements Registration Database (WERD) and other available sources. Historical water use data was gathered by the Gympie office on DNR&M during the model calibration stage (June 1999).

Table 2.1 shows the sources of data for each of the water user types in the Basin. Table 2.2 shows the information used for each demand node for the Full Utilisation of Existing Entitlements case (CR25) of the Mary. Table 2.3 shows the information used for the demand nodes in the Burrum River model.

Sunwater identified 12000 ML/year of unallocated water in the Basin that arose from the raising of Borumba Dam in 1998. This consists of 3000 ML/year high priority water and 9000 ML/year of medium priority water.

Table 2.4 shows the current utilization case for the Mary River, which was determined by looking at annual historical use. In general, it was assumed that regulated irrigators used 50% of their allocation, with the exception of Nestles and the Deep Creek irrigators. The latter were assumed to be 100% of their full entitlement (based on historical use) and the former assumed to be 15 ML/a (based on historical use over the last 15 years). Town water supplies were adopted based on historical use and information provided by the Regional Office.

Table 2.1 Licence/Node Information Required and Information Sources

Licence Type	IQQM Node Type	Requirements	Data Source
Urban/Industrial	3.0 *	Allocation (ML/yr)	WERD/IROL or the Order-In-Council
		Use distribution pattern	Monthly pattern which is either based on historical use (where available) or constant pattern.
Stock and Domestic	3.0 & 3.1	Allocation (ML/yr)	WERD
		Use distribution pattern	Constant monthly pattern
Regulated Irrigation	8.0	Nominal Allocation (ML/yr)	WERD/IROL (converted to planted area by dividing by 10 ML/ha/a)
		Use distribution pattern	Crop model pattern used is based on the average historical pattern for regulated use in the reach.
		Pump Capacity (ML/d)	Based on pump capacity (mm) vs. pump capacity (L/s) information provided by Gympie Office.
Unregulated Irrigation	8.3	Allocation (ha)	WERD
		Use distribution pattern	Crop model calibrated to unregulated irrigation data for the reach
Unregulated Waterharvesting	8.3	Pump Capacity (ML/d)	Based on pump capacity (mm) vs. pump capacity (L/s) information provided by Gympie Office.
		Planted area (ha)	Offstream storage capacity/4
		Use distribution pattern	Crop model pattern calibrated to unregulated irrigation data for the reach
		Pump Capacity (ML/d)	Based on pump capacity (mm) vs. pump capacity (L/s) information provided by Gympie Office.
		Offstream Storage Capacity (ML)	WERD or pump capacity (ML/d) * 5
Start Flows (ML/d)	WERD		

*Note: The Nestles industrial demand (node 141) has been modelled as an 8.0 node, as it is a medium priority use, not high priority as with other urban and industrial supplies.

Table 2.2 Mary River Full Utilisation Demands

Node #	Node Name	Node Type	Urban (ML/a)	Stock & Domestic (ML/a)	Regulated Use		Unregulated Use		WH OSS Size (ML)	WH Threshold Location & Volume (ML/day)	Pump Capacity (ML/day)
					Irrigation (ML/a)	Regulated Use (ML/a)	Irrig. (ha/yr)	WH Planted Area (ha/yr)			
287	Unreg 291+	8.3					186				63
286	Unreg WH 291+	8.3						27	120	36	17
284	Conondale TWS	3.1	16								
282	Unreg 274 – 291	8.3					282				89
278	Unreg 270 – 274	8.3					35				16
273	Obi Unreg 26.9 km+	8.3					164				68
270	Maleny TWS	3.0	125								
262	Sunshine Coast TWS	3.0	36500								
260	Unreg 8.7 – 26.9	8.3					210				113
259	Unreg WH Obi	8.3						16	25	14	5
254	Unreg Irr – DS Kidaman	8.3					184				56
251	Kenilworth TWS	3.1	350								
248	Unreg 244 – 270 km	8.3					496				131
247	Unreg WH 244 – 291	8.3						4	17	0	5
297	Stock & Dom 204.7 +	3.1		537							
235	Unreg 226.9 – 244.1	8.3					505				108
244	Unreg WH 226.9 – 244.1	8.3						12	56	0	4
232	Jimna TWS	3.0	20								
229	Reg Borumba to Imbil	8.0			1188						
228	Unallocated Yabba	8.0			1000						
222	Imbil TWS + Borumba Amenities	3.0	180								
221	Unallocated Hyne & Sons	3.0	60								
220	Reg Imbil to Conf	8.0			1710						

Node #	Node Name	Node Type	Urban (ML/a)	Stock & Domestic (ML/a)	Regulated Use		Unregulated Use		WH OSS Size (ML)	WH Threshold Location & Volume (ML/day)	Pump Capacity (ML/day)
					Irrigation (ML/a)	Irrig. (ha/yr)	WH Planted Area (ha/yr)				
218	Unreg Irr – DS Imbil	8.3					61				19
243	Unallocated Yabba to Miva	8.0			1000						
213	Noosa TWS Coles Crossing	3.0	4000								
295	Unallocated Noosa	3.0	2500								
212	Reg Irr 204.7 – 226.9	8.0			3212						
210	Unreg 204.7 – 226.9	8.3				155					49
209	Unreg WH 204.7 – 226.9	8.3					2	9	1		2
207	Unreg Kan 15.3+	8.3				159					51
199	Industrial (Hyne & Sons)	3.0	10								
196	Kandanga TWS	3.0	59								
195	Unreg Kan 0 – 15.3	8.3				272					102
194	Unreg WH Kan 0 – 15.3	8.3					31.1	140	7		16
185	Reg Irr 201.6 – 204.7 km	8.0			629						
176	Amamoor TWS	3.1	32								
175	Unreg Am 16.6 km	8.3				329					201
172	Reg Irr 186.1 – 201.6 km	8.0			1909						
309	Unreg WH SM 55km+	8.3					4	16	Cooroy Weir > 8000 ML		2
166	Cooroy/Noosa TWS	3.0	5000								
163	Unreg SM 32.4 – 55	8.3				150					57
159	Unreg Irr SM 0 – 32.4	8.3				223					66
156	Reg Irr 181.8 – 186.1 km	8.0			532						
152	Gympie TWS	3.0	3454								
148	Reg Irrig Cedar Pkt Dam	8.0			512						
145	Unreg D 0 – 25.2 km	8.3				312					125
144	Unreg WH D 0 – 25.2 km	8.3					3	13	1		4

Node #	Node Name	Node Type	Urban (ML/a)	Stock & Domestic (ML/a)	Regulated Use		Unregulated Use		WH OSS Size (ML)	WH Threshold Location & Volume (ML/day)	Pump Capacity (ML/day)
					Irrigation (ML/a)	Stock (ML/a)	Irrig. (ha/yr)	WH Planted Area (ha/yr)			
141	Industrial (Nestles)	8.0	400								
140	Reg Irrig 170.4 – 204.7	8.0			537						
138	Unreg 170.4 – 204.7	8.3				357					307
135	Unreg Pie	8.3				210					124
134	Unreg WH Pie US	8.3					6	29	0		3
186	Initial Loss Pie Ck Pipeline	3.0	60								
189	Reg Pie Ck Pipeline (inc 426 ML CL)	8.0			738						
131	Reg Irrig Pie Ck	8.0			552						
130	Unreg DSPie	8.3				53					25
458	WH Pie creek	8.3					100	450	70		15.5
116	Stock & Domestic 0 – 204.7 km	3.1		635							
113	Unreg G 12.7 +	8.3				129					61
109	Unreg Irr Glaston to Conf	8.3				72					21
106	Reg Irr 153 – 170 km	8.0			1340						
103	Unreg Irr Widgee	8.3				389					103
455	WH Widgee	8.3					70	315	70		7.85
100	Reg Irr 136 – 153 km	8.0			2567						
98	Unreg 126 – 170	8.0				149					107
93	Goomeri TWS	3.1	109								
90	Unreg Irr WB 54+	8.3				200					63
300	Unreg WH WB 54+	8.3					10	45	15		17
87	Kilkivan TWS	3.1	150								
85	Unreg WB 12.9 – 54	8.3				419					123
310	Unreg WH WB 12.9 – 54	8.3					9	45	0		5
082	Woolooga TWS	3.0	50				92	414	200		14.3

Node #	Node Name	Node Type	Urban (ML/a)	Stock & Domestic (ML/a)	Regulated Use		Unregulated Use		WH OSS Size (ML)	WH Threshold Location & Volume (ML/day)	Pump Capacity (ML/day)
					Irrigation (ML/a)	WH Planted Area (ha/yr)	Irrig. (ha/yr)	WH Planted Area (ha/yr)			
79	Unreg WB 0 – 12.9	8.3					88				28
078	WH Wide Bay	8.3									
76	Reg Irr 126 – 136 km	8.0			480						
124	Unallocated Water Miva to Mary Barrage	8.0			1000						
72	Reg Irr 111 – 126 km	8.0			2739						
64	Unreg WH Munna 32.7+	8.3				77		347	0		1
58	Unreg Munna	8.3				123					43
57	Unreg WH Munna	8.3					1	3.7	1		1
56	Unreg WH Munna	8.3					1	5	19		1
55	Unreg WH Munna	8.3					4	16	95		1
52	Unreg 0 - 126	8.3					234				65
47	Reg Irrig 89 – 111	8.0			312						
44	Unreg Myrtle	8.3				112					24
43	Unreg WH Myrtle	8.3						90	45		5
302	Unreg WH Myrtle	8.3						97	206		5
457	WH Myrtle	8.3						97	206		5
38	Tiaro TWS	3.0	45								
123	Unallocated HP	3.0	75								
35	Unallocated (Canterwood)	3.0	5								
296	Unallocated Barrage	8.0			3000						
36	Reg Irr Mary Barrage	8.0			4532						
33	Initial Loss Copenhagen Bend	3.0	72								
32	Copenhagen Reg Irr (inc 1777 ML CL *)	8.0			4383						
67	Initial Loss Main Road	3.0	102								
68	Main Road Irr	8.0			6155						

Node #	Node Name	Node Type	Urban (ML/a)	Stock & Domestic (ML/a)	Regulated Use		Unregulated Use		WH OSS Size (ML)	WH Threshold Location & Volume (ML/day)	Pump Capacity (ML/day)
					Irrigation (ML/a)	Regulated Use (ML/a)	Irrig. (ha/yr)	WH Planted Area (ha/yr)			
	(inc 2496 ML CL *)										
026	Unreg Tinana 107+	8.3						395			177
025	Unreg WH Tinana 107+	8.3							12	3	7
022	Unreg Tinana 50 – 107	8.3					539				170
021	Unreg WH 50 – 107	8.3							275	4	17
029	Unreg WH 50 – 107	8.3							70	13	2
015	Unreg Tinana 0 – 50.1	8.3					80				25
011	Maryborough TWS	3.0	6819								
010	Reg Irr Teddington	8.0				2426					
452	WH Myrtle	8.3							428	300	14.7
009	Unallocated	3.0	1360								
005	Reg Irr Tinana Barrage	8.0				5205					
003	Walker Point Reg Irr (inc 315 ML CL *)	8.0				3990					
004	Initial Loss Walker Point	3.0	150								
122	Unallocated	8.0				3000					

* CL = Continuing Loss

Table 2.3 Burrum River Full Utilization Demands

Node #	Node Name	Node Type	Urban (ML/a)	Stock & Domestic (ML/a)	Regulated Use		Unregulated Use		WH OSS Size (ML)	WH Threshold Location & Volume (ML/day)	Pump Capacity (ML/day)
					Irrigation (ML/a)	Irrig. (ha/yr)	WH Planted Area (ha/yr)				
030	Burrum 31.4 km +	8.3					129				28
029	Burrum WH 31.4 +	8.3						1	123	5	16
023	Burrum 25.2 – 31.4	8.3				34.5					12
017	Burrum 20.5 – 25.2	8.3				41					13.5
010	Unreg demand 3	8.3				50					5.4
012	Hervey Bay TWS	3.0	7740								
056	Beelbi Ck	8.3						28	126		25

Table 2.4 Mary River Current Utilisation Demands

Node #	Node Name	Node Type	Urban (ML/a)	Stock & Domestic (ML/a)	Regulated Use		Unregulated Use		WH OSS Size (ML)	WH Threshold Location & Volume (ML/day)	Pump Capacity (ML/day)
					Irrigation (ML/a)	Irrig. (ha/yr)	WH Planted Area (ha/yr)	WH Irrig. (ha/yr)			
287	Unreg 291+	8.3					115				42
286	Unreg WH 291+	8.3						27	120	36	17
284	Conondale TWS	3.1	16								
282	Unreg 274 – 291	8.3					233				67
278	Unreg 270 – 274	8.3					22				12
273	Obi Unreg 26.9 km+	8.3					109				50
270	Maleny TWS	3.0	125								
262	Sunshine Coast TWS	3.0	18000								
260	Unreg 8.7 – 26.9	8.3					199				95
259	Unreg WH Obi	8.3						16	25	14	5
254	Unreg Irr – DS Kidaman	8.3					178				48
251	Kenilworth TWS	3.1	220								
248	Unreg 244 – 270 km	8.3					425				110
247	Unreg WH 244 – 291	8.3						1	5	0	1
297	Stock & Dom 204.7 +	3.1		537							
235	Unreg 226.9 – 244.1	8.3					395				75
244	Unreg WH 226.9 – 244.1	8.3						12	56	0	4
232	Jimna TWS	3.0	20								
229	Reg Borumba to Imbil	8.0				594					
228	Unallocated Yabba	8.0				0					
222	Imbil TWS + Borumba Amenities	3.0	180								
221	Unallocated Hyne & Sons	3.0	60								
220	Reg Imbil to Conf	8.0				855					
218	Unreg Irr – DS Imbil	8.3					33				6

Node #	Node Name	Node Type	Urban (ML/a)	Stock & Domestic (ML/a)	Regulated Use		Unregulated Use		WH OSS Size (ML)	WH Threshold Location & Volume (ML/day)	Pump Capacity (ML/day)
					Irrigation (ML/a)	Irrig. (ha/yr)	WH Planted Area (ha/yr)				
243	Unallocated Yabba to Miva	8.0			0						
213	Noosa TWS Coles Crossing	3.0	1500								
295	Unallocated Noosa	3.0	0								
212	Reg Irr 204.7 – 226.9	8.0			1606						
210	Unreg 204.7 – 226.9	8.3				116					30
209	Unreg WH 204.7 – 226.9	8.3					2	9	1		2
207	Unreg Kan 15.3+	8.3				92					29
199	Industrial (Hyne & Sons)	3.0	10								
196	Kandanga TWS	3.0	30								
195	Unreg Kan 0 – 15.3	8.3				250					94
194	Unreg WH Kan 0 – 15.3	8.3									0
185	Reg Irr 201.6 – 204.7 km	8.0			315						
176	Amamoor TWS	3.1	20								
175	Unreg Am 16.6 km	8.3				287					171
172	Reg Irr 186.1 – 201.6 km	8.0			955						
309	Unreg WH SM 55km+	8.3					4	16	Cooroy Weir > 9300 ML		2
166	Cooroy/Noosa TWS	3.0	4500								
163	Unreg SM 32.4 – 55	8.3				91					34
159	Unreg Irr SM 0 – 32.4	8.3				145					37
156	Reg Irr 181.8 – 186.1 km	8.0			266						
152	Gympie TWS	3.0	3454								
148	Reg Irrig Cedar Pkt Dam	8.0			512						
145	Unreg D 0 – 25.2 km	8.3				257					93
144	Unreg WH D 0 – 25.2km	8.3					3	13	1		4
141	Industrial (Nestles)	8.0	15								

Node #	Node Name	Node Type	Urban (ML/a)	Stock & Domestic (ML/a)	Regulated Use		Unregulated Use		WH OSS Size (ML)	WH Threshold Location & Volume (ML/day)	Pump Capacity (ML/day)
					Irrigation (ML/a)	Irrig. (ha/yr)	WH Planted Area (ha/yr)				
140	Reg Irrig 170.4 – 204.7	8.0			269						
138	Unreg 170.4 – 204.7	8.3				297					242
135	Unreg Pie	8.3				184					115
134	Unreg WH Pie US	8.3					6	29	0		3
186	Initial Loss Pie Ck Pipeline	3.0	60								
189	Reg Pie Ck Pipeline (inc 426 ML CL)	8.0			369						
131	Reg Irrig Pie Ck	8.0			276						
130	Unreg DSPie	8.3				31					22
116	Stock & Domestic 0 – 204.7 km	3.1		635							
113	Unreg G 12.7 +	8.3				102					53
109	Unreg Irr Glaston to Conf	8.3				29					7
106	Reg Irr 153 – 170 km	8.0			717						
103	Unreg Irr Widgee	8.3				239					65
100	Reg Irr 136 – 153 km	8.0			1284						
98	Unreg 126 – 170	8.0				115					77
93	Goomeri TWS	3.1	60								
90	Unreg Irr WB 54+	8.3				162					54
300	Unreg WH WB 54+	8.3					10	45	15		17
87	Kilkivan TWS	3.1	100								
85	Unreg WB 12.9 – 54	8.3				393					117
310	Unreg WH WB 12.9 – 54	8.3					9	45	0		5
79	Unreg WB 0 – 12.9	8.3				88					28
76	Reg Irr 126 – 136 km	8.0			240						
124	Unallocated Water Miva to Mary Barrage	8.0			0						

Node #	Node Name	Node Type	Urban (ML/a)	Stock & Domestic (ML/a)	Regulated Use		Unregulated Use		WH OSS Size (ML)	WH Threshold Location & Volume (ML/day)	Pump Capacity (ML/day)
					Irrigation (ML/a)	Unreg. Irrig. (ha/yr)	WH Planted Area (ha/yr)				
72	Reg Irr 111 – 126 km	8.0			1370						
64	Unreg WH Munna 32.7+	8.3									0
58	Unreg Munna	8.3				80					31
57	Unreg WH Munna	8.3									0
56	Unreg WH Munna	8.3									0
55	Unreg WH Munna	8.3									0
52	Unreg 0 - 126	8.3				223					36
47	Reg Irrig 89 – 111	8.0			156						
44	Unreg Myrtle	8.3				112					24
43	Unreg WH Myrtle	8.3					20	90	45		5
302	Unreg WH Myrtle	8.3					22	97	206		5
38	Tiaro TWS	3.0	45								
123	Unallocated HP	3.0	0								
35	Unallocated (Canterwood)	3.0	5								
296	Unallocated Barrage	8.0			0						
36	Reg Irr Mary Barrage	8.0			2266						
33	Initial Loss Copenhagen Bend	3.0	72								
32	Copenhagen Reg Irr (inc 1777 ML CL *)	8.0			2192						
67	Initial Loss Main Road	3.0	102								
68	Main Road Irr (inc 2496 ML CL *)	8.0			3078						
026	Unreg Tinana 107+	8.3				304					147
025	Unreg WH Tinana 107+	8.3					2	8	3		1
022	Unreg Tinana 50 – 107	8.3				431					114
021	Unreg WH 50 – 107	8.3					61	275	4		17
029	Unreg WH 50 – 107	8.3					16	70	13		2

Node #	Node Name	Node Type	Urban (ML/a)	Stock & Domestic (ML/a)	Regulated Use		Unregulated Use		WH OSS Size (ML)	WH Threshold Location & Volume (ML/day)	Pump Capacity (ML/day)
					Irrigation (ML/a)	WH Planted Area (ha/yr)	Irrig. (ha/yr)	WH Planted Area (ha/yr)			
015	Unreg Tinana 0 – 50.1	8.3					46				17
011	Maryborough TWS	3.0	4500								
010	Reg Irr Teddington	8.0			1213						
009	Unallocated	3.0	0								
005	Reg Irr Tinana Barrage	8.0			2603						
003	Walker Point Reg Irr (inc 315 ML CL *)	8.0			1995						
004	Initial Loss Walker Point	3.0	150								
122	Unallocated	8.0			0						

* CL = Continuing Loss

3 HOW DEMANDS ARE MODELLED FOR EACH USER TYPE

3.1 Urban Users

Urban users have been modelled as type 3.0 nodes. This node distributed an annual demand (se to the existing urban nominal allocation) according to a monthly pattern of use. The pattern of use has been derived from historical water use information or else has been set to a constant monthly pattern. Table 3.1 shows the pattern of use adopted for each urban user.

Table 3.1 Monthly Patterns for Urban Demand

Demand Location	Monthly Demand (%)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MARY												
Conondale	8.99	8.68	8.99	8.01	8.00	8.01	8.00	8.00	8.01	8.00	8.01	8.99
Maleny	8.99	8.68	8.99	8.01	8.00	8.01	8.00	8.00	8.01	8.00	8.01	8.99
Sunshine Coast	10.01	7.73	8	6.99	7.01	6.99	7.01	8.99	9	8.99	9	10.01
Kenilworth	8.99	8.68	8.99	8.01	8.00	8.01	8.00	8.00	8.01	8.00	8.01	8.99
Jimna	8.99	8.68	8.99	8.01	8.00	8.01	8.00	8.00	8.01	8.00	8.01	8.99
Imbil	8.99	8.68	8.99	8.01	8.00	8.01	8.00	8.00	8.01	8.00	8.01	8.99
Noosa (Coles Crossing)	10.01	7.73	8.99	8.01	7.01	6.99	8	8	9	8.99	8.01	8.99
Kandanga	8.99	8.68	8.99	8.01	8.00	8.01	8.00	8.00	8.01	8.00	8.01	8.99
Amamoor	8.99	8.68	8.99	8.01	8.00	8.01	8.00	8.00	8.01	8.00	8.01	8.99
Noosa /Cooroy	10.01	7.73	8.99	8.01	7.01	6.99	8	8	9	8.99	8.01	8.99
Gympie	9	8	8	8	8	7	7	8	9	10	9	9
Goomeri	8.99	8.68	8.99	8.01	8.00	8.01	8.00	8.00	8.01	8.00	8.01	8.99
Kilkivan	8.99	8.68	8.99	8.01	8.00	8.01	8.00	8.00	8.01	8.00	8.01	8.99
Tiaro	8.37	7.56	8.37	8.1	8.37	8.1	8.37	8.37	8.1	8.37	8.1	8.37
Maryborough	8.99	7.73	8	8.01	7.01	6.99	8	8.99	9	8.99	9	8.99
BURRUM												
Hervey Bay	10	8	8	8	7	7	7	8	9	9	9	10
BEELBI												
Hervey Bay	9	9	9	8	8	8	8	8	8	8	8	9

3.2 Regulated Users

Regulated irrigation and industrial use are not separated out. These combined users have been modelled using 8.0 type nodes such that the nominal allocation does not change from year to year and has a particular monthly use pattern.

Two patterns were adopted for the regulated water users, based on location. The two patterns are based on the average measured monthly demands (adjusted from three monthly demands) for the Mary Valley Irrigation Project (including Cedar Pocket and Pie Creek Systems) and the Lower Mary Irrigation Area. Crop use and demand is relatively consistent within these two groups. Table 3.2 shows the pattern used for the regulated irrigation demands.

Table 3.2 Monthly pattern for Regulated Irrigation Demand

Demand Location	Monthly Pattern											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MVIP	6	6	6	7	7	7	8	10	14	11	10	8
LMIA	15	17	14	9	9	4	2	3	4	6	6	12
Nestles	9	9	9	8	8	8	8	8	8	8	8	9

For those irrigators in the channel sections (Pie Creek, parts of the Lower Mary Irrigation Area), Sunwater have specified an initial loss (high priority) and a continuing loss (medium priority). The initial loss has been specified as a separate demand node, type 3.0, assuming that the full loss is taken on July 1. The continuing loss has been added to the nominal allocation for each node (see Table 2.2).

There are no regulated irrigators in the Burrum River Basin.

3.3 Unregulated Irrigation and Waterharvesting

Unregulated irrigators and waterharvesters have been modelled as type 8.3 nodes. Crop model nodes that were developed with the appropriate crop mix for each reach, and used to produce the unregulated demand files, were added into the simulation model to replace the demand files. The licensed area associated with the reach was used in the crop model. These crop model nodes were developed as outlined below.

The IQQM Calibration Report outlines the procedure taken to calibrate the crop factors.

3.4 Stock and Domestic Demands

Stock and domestic users have been modelled as type 3.0 and 3.1 nodes. These node types distribute an annual demand (set to the existing stock and domestic allocation) according to a monthly pattern of use. The pattern of use has been defined as the same in all months.

Stock and domestic demands for the Basin were grouped into two nodes so that at least 1 ML/day would be extracted (365 ML/year).

4 ALLOCATION RULES

As the Burrum River does not have regulated irrigators, no allocation rules were necessary.

4.1 Allocation Model in Use

All systems have been run using the 100/allocation announced allocation model. This rule assumes that irrigators ask for 100% of their entitlement each year (i.e. 100% planted area) and the existing (or pre defined) allocation rule which has provisions for inflows is used to calculate the announced allocation during the water year. For all systems the allocation is recalculated at a 2 weekly interval in the IQQM.

Using the 100/allocation rules leads to two different types of failures in the system:

- The announced allocation is 100% but there is not enough flow in the river to meet the demand so there is a failure
- The announced allocation is less than 100% so the dam will not release enough water to meet the demand.

This rule is the same as that used in previous monthly modelling of the Mary Basin.

The remainder of this section outlines the details of the allocation rules used in the IQQM Existing entitlement case for the irrigation systems located in the Mary Basin. This data is based on the Sunwater IROL.

4.2 Mary Valley Water Supply Scheme

The Mary Valley Water Supply Scheme consists of all irrigators in the regulated section of Yabba Creek, irrigators on the Mary River from the Yabba Creek Confluence to the top of the ponded area of Mary Barrage, and the Pie Creek Pipeline and supplemented sections.

- Water year is 1/7 to 30/6
- Carryover allowance is 5097 ML/yr (six months supply high priority, including unallocated water)
- Evaporation allowance is 12 months
- Distribution loss is 30%
- Minimum inflows as shown in Table 4.1. These inflows are 11000 ML/year, distributed as provided by Sunwater.

Table 4.1 Mary Valley Water Supply Scheme Minimum Inflows

Month	Mary Valley Minimum Inflows (ML/month)
Jan	1215
Feb	2047
Mar	2855
Apr	209
May	485
Jun	800
Jul	76
Aug	139
Sep	392
Oct	580
Nov	986
Dec	1216
<i>Total</i>	<i>11000</i>

4.3 Lower Mary Water Supply Scheme

The Lower Mary Water Supply Scheme consists of the Mary Barrage, Tinana Barrage, and Lower Mary Irrigation Area.

- Water year is 1/7 to 30/6
- Carryover allowance is 4152 ML/yr (six months supply high priority, including unallocated water)
- Evaporation allowance is 12 months
- Distribution loss for riparian irrigators is 10%. Losses for the pipeline systems have been specified and included as demand nodes (initial loss) or added to the allocation demand (continuing loss)
- Minimum inflows as shown in Table 4.2. These inflows are 29900 ML/year, distributed as provided by Sunwater.

Table 4.2 Lower Mary Water Supply Scheme Minimum Inflows

Month	Mary Barrage Minimum Inflows (ML/month)
Jan	838
Feb	341
Mar	10306
Apr	0
May	7619
Jun	8161
Jul	78
Aug	0
Sep	0
Oct	553
Nov	553
Dec	1451
<i>Total</i>	<i>29900</i>

4.4 Cedar Pocket Water Supply Scheme

The Cedar Pocket Water Supply Scheme consists of the irrigators supplied from Cedar Pocket Dam on Deep Creek.

- Water year is 1/7 to 30/6
- Carryover allowance is 0 ML/yr
- Evaporation allowance is 0 ML/yr
- Distribution loss is 0%
- No minimum inflows are specified.

5 STORAGE DATA

Table 5.1 shows the details of the storages included in the model, their location, the storage area curve being used for them and their full storage and dead storage volumes.

Table 5.1 Storage Details

Storage	Location	Construction Date	Area/Volume Plan	Full Storage (ML)	Dead Storage (ML)	Required Storage (ML)
MARY BASIN						
Jimna Weir	75.9 km Yabba Ck	2000	Estimated	8	3	
Borumba Dam	31.1 km Yabba Ck	1964/1998	A3 - 202667	46000	1200	
Imbil Weir	10.9 km Yabba Ck	1954	F 36520	46	15	46
Upper Kings Weir	48.8 km Obi Obi Ck	1960	Estimated	57	?	
Maleny Weir	47.4 km Obi Obi Ck	1960	Estimated	66.4	?	
Baroon Pocket Dam	26.5 km Obi Obi Ck	1988	A3 – 22807	61000	4500	
Goomeri Weir	Kinbombi Ck	1960	Estimated	146	?	
Kandanga Weir	9.01 km Kandanga Ck	1960	S 24132	25	10	
Cooroy Weir (Lake McDonald)	55.0 km Six Mile Ck	1965	A2 – 55969	8000	800	
Gympie Control Weir	179.5 km Mary River	1986	Estimated	0	0	0
Cedar Pocket Dam	25.2 km Deep Ck	1984	A3 – 211963	730	16	
Mary Barrage	59.3 km Mary River	1984	A4 – 139269	12000	5050	
Tallegalla Weir	37.5 km Tinana Ck	1945	Estimated	385	0	
Teddington Weir	16.1 km Tinana Ck	1974	Unnumbered dwg	3650	400	400
Tinana Barrage	1.6 km Tinana Ck	1980	A4 - 138998	4750	2015	3230
BURRUM BASIN						
Lenthalls Dam	31.4 km Burrum River	1984		17796	500	
Weir No.2	25.2 km Burrum River	1951		2242	220	2230
Weir No.1	20.5 km Burrum River	c. 1900		1715	638	1390
Cassava 1	16.9 km Beelbi Creek	?		2198	?	
Cassava 2		?		426	?	

6 MINIMUM FLOW REQUIREMENTS

6.1 Gympie

As part of the operating rules for the Mary Valley Water Supply Scheme, a minimum flow requirement of 80 ML/day has been included at Gympie, just below the control weir.

6.2 Cooroy Weir

When inflow is less than 2.5 ML/day, all inflow is released, above the dead storage of 800ML in Cooroy Weir.

6.3 Baroon Pocket Dam

There is a compensation release requirement of 2000 ML/a for Baroon Pocket Dam. This has been modelled as a constant annual demand of 2000 ML/a, distributed as specified by Caloundra-Maroochy Water Board and shown in Table 6.1.

Table 6.1 Baroon Pocket Dam Compensation Release

Monthly Pattern %											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	5	10	15	20	20	15	5	5

7 IRRIGATION ORDERS

7.1 Over Order Factors

As a result of the minimum flow requirement at Gympie, no over order factors have been applied to Mary Valley irrigators.

No over order factors were applied to Lower Mary Irrigation Area irrigators because

- The non-channel irrigators pump directly from the Barrage or Weir pools.
- The channel irrigators have losses accounted for in their overall demands.

7.2 Irrigation Order Times

Table 7.1 shows the order times used for irrigators ordering from each storage in the Mary Simulation models.

Table 7.1 Order Times

Storage	River Reach	Order Time (days)
Borumba Dam	Dam to Imbil	0
	Imbil to Mary Confluence	0
	Yabba Ck to Gympie Control Weir	1
	Gympie Control Weir to Fishermans Pocket Gauge	2
	Fishermans Pocket Gauge to Glastonbury Ck	2
	Glastonbury Ck to Widgee Ck	2
	Widgee Ck to Miva	2
	Miva to Mary Barrage	3
Mary Barrage	Copenhagen Bend PS	1
	Main Road	1
Teddington Weir		0
Tinana Barrage		0
	Walker Point PS	1

8 PUMP STATION CAPACITIES

Table 8.1 shows the capacities of the pump stations and associated channels used in the modelling.

Pump Station	Capacity (ML/day)
Pie Creek	15
Owanyilla	243
Copenhagen Bend	65
Walker Point	75

9 LOWER MARY IRRIGATION AREA

A series of controls have been placed on the irrigators in the Lower Mary Irrigation Area. The first is on the Owanyilla and Copenhagen Bend pump stations, which have been restricted to pumping when Mary Barrage is above 6900 ML. This corresponds to the level at which the pumps are located in the pond.

The second restricts medium priority irrigators from pumping when Teddington Weir falls below 2800 ML. This corresponds to 1m below full supply level, at which point the irrigators are prevented from pumping as per Maryborough City Council drought management rules.

High priority supplies, both sold and unsold, are unaffected by this restriction.

10 NODES WHERE FLOWS ARE TO BE EXTRACTED FROM

Table 10.1 lists the nodes where flow data will be extracted from the Mary IQQM model.

Table 10.2 lists the nodes where flow data will be extracted from the Burrum IQQM model.

Table 10.1 Mary River Nodes where Flow Data Will be Reported

Node Number	Stream / Storage	Gauging Station
276	Mary River	Bellbird Creek
250		Kenilworth
245		Moy Pocket
190		Dagun Pocket
125		Fisherman's Pocket
73		Miva.
49		Home Park
30		Estuary
039		Mary Barrage
268	Obi Obi Creek	Gardners Falls
256		Kidaman
263	Baroon Pocket Dam	
230	Borumba Dam	
224	Yabba Creek	Imbil
204	Kandanga Creek	Hygait
279	Pie/McIntosh/Calico Creek	
178	Amamoor Creek	Zachariah
167	Six Mile Creek Dam	
161	Six Mile Creek	Cooran
149	Cedar Pocket Dam	
273	Deep Creek	
111	Glastonbury Creek	Glastonbury
89	Wide Bay Creek	Kilkivan
81		Brooyar
61	Munna Creek	Marodian
24	Tinana Creek	Tagigan Road
18		Bauple East
012	Teddington Weir	
006	Tinana Barrage	

Table 10.2 Burrum River Nodes where Flow Data Will be Reported

Node Number	Stream / Storage	Gauging Station
028	Lenthalls Dam	
020	Weir No. 2	
015	Weir No. 1	
011	End of system	
063	Cassava Dam 2	
057	Cassava Dam 1	
051	End of system	

Volume 2

Maroochy, Mooloolah, Noosa Rivers IQQM Full and Current Utilisation Assumptions

Prepared by:

**Water Assessment Group
Department of Natural Resources & Mines**

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TABLE OF CONTENTS

LIST OF TABLES iii

1 INTRODUCTION..... 1

2 DATA AND DATA SOURCES FOR WATER USERS 1

3 HOW DEMANDS ARE MODELLED FOR EACH USER TYPE 5

 3.1 Urban Users 5

 3.2 Unregulated Irrigation and Waterharvesting 5

 3.3 Stock and Domestic Demands 5

4 STORAGE DATA..... 6

5 PUMP STATION CAPACITIES..... 6

6 NODES WHERE FLOWS ARE TO BE EXTRACTED FROM..... 7

LIST OF TABLES

Table 2.1	Licence/Node Information Required and Information Sources.....	2
Table 2.2	Maroochy, Mooloolah, and Noosa Rivers Full Utilisation Demands	3
Table 2.3	Maroochy, Mooloolah, and Noosa Rivers Current Utilisation Demands	4
Table 3.1	Monthly Patterns for Urban Demand.....	5
Table 4.1	Storage Details	6
Table 5.1	Pump Capacity- Maroochy Transfers.....	6
Table 6.1	Mary River Nodes where Flow Data Will be Reported	7

1 INTRODUCTION

This document outlines the assumptions and information being used in scenario modelling for the Mary River WRP Study. Daily flow models have been developed for the Maroochy, Mooloolah, and Noosa Rivers using the Integrated Quantity and Quality Model (IQQM) developed by the Department of Land and Water Conservation in New South Wales.

2 DATA AND DATA SOURCES FOR WATER USERS

This section presents the information used to model various types of water use within each Basin. Licence information has been collated by the Regional Office, based on the Water Entitlements Registration Database (WERD) and other available sources. Historical water use data was gathered by the Gympie office on DNR&M during the model calibration stage (June 2001).

Table 2.1 shows the sources of data for each of the water user types in the Basin. Table 2.2 shows the information used for each demand node for the Existing Entitlements cases. Table 2.3 shows the information used for the demand nodes for the Current Development cases. This was determined by looking at annual historical use. Town water supplies were adopted based on historical use and information provided by the Regional Office.

Table 2.1 Licence/Node Information Required and Information Sources

Licence Type	IQQM Node Type	Requirements	Data Source
Urban/Industrial	3.0 *	Allocation (ML/yr)	WERD/IROL or the Order-In-Council
		Use distribution pattern	Monthly pattern which is either based on historical use (where available) or constant pattern.
Stock and Domestic	3.0 & 3.1	Allocation (ML/yr)	WERD
		Use distribution pattern	Constant monthly pattern
Unregulated Irrigation	8.3	Allocation (ha)	WERD
		Use distribution pattern	Crop model calibrated to unregulated irrigation data for the reach
Unregulated Waterharvesting	8.3	Pump Capacity (ML/d)	Based on pump capacity (mm) vs. pump capacity (L/s) information provided by Gympie Office.
		Planted area (ha)	Offstream storage capacity/4
		Use distribution pattern	Crop model pattern calibrated to unregulated irrigation data for the reach
		Pump Capacity (ML/d)	Based on pump capacity (mm) vs. pump capacity (L/s) information provided by Gympie Office.
		Offstream Storage Capacity (ML)	WERD or pump capacity (ML/d) * 5
		Start Flows (ML/d)	WERD

Table 2.2 Maroochy, Mooloolah, and Noosa Rivers Full Utilisation Demands

Node #	Node Name	Node Type	Urban (ML/a)	Stock & Domestic (ML/a)	Unregulated Use		WH OSS Size (ML)	WH Threshold Location & Volume (ML/day)	Pump Capacity (ML/day)
					Irrig. (ha/yr)	WH Planted Area (ha/yr)			
199	Tin Can Bay TWS	3.1	1950						
194	Kin Kin Unreg	8.3			330				97
193	Kin Kin Unreg WH	8.3				12	13	0	2
100	N Maroochy Unreg 14.2 km+	8.3			109				37
099	N Maroochy Unreg WH 14.2 km+	8.3				1	6	5	11
094	Browns Ck Unreg	8.3			13				2
091	N Maroochy Unreg 0 – 14.2 km	8.3			81				32
088	Rocky Ck Unreg	8.3			49				7
068	S Maroochy Unreg 37.6km+	8.3			71				28
075	S Maroochy Unreg 34.2 – 37.6 km	8.3			57				22
074	S Maroochy Unreg WH 34.2 – 37.6 km	8.3				8	18	2.6	1
057	Poona TWS Extraction	3.0	16500						
053	S Maroochy Unreg 0 – 34.2 km	8.3			23				7
046	Petrie Ck Unreg 14.8 km+	8.3			131				119
043	Petrie Ck Unreg 0-14.8 km+	8.3			172				111
042	Petrie Ck Unreg WH 0-14.8 km+	8.3				5	4	0	3
039	Eudlo Ck Unreg 6.5km+	8.3			130				34
038	Eudlo Ck Unreg WH 6.5 km+	8.3				12	18	0	5
036	Eudlo Ck Unreg 0- 6.5km+	8.3			18				19
032	Maroochy Unreg	8.3			44				12
020	Mooloolah Unreg 33.2km+	8.3			35				15
015	Ewen Maddock TWS	3.0	445						
007	Mooloolah Diversion W TWS	3.1	3870						
010	Mooloolah Unreg 0-33.2km	8.3			49				14

Table 2.3 Maroochy, Mooloolah, and Noosa Rivers Current Utilisation Demands

Node #	Node Name	Node Type	Urban (ML/a)	Stock & Domestic (ML/a)	Unregulated Use		WH OSS Size (ML)	WH Threshold Location & Volume (ML/day)	Pump Capacity (ML/day)
					Irrig. (ha/yr)	WH Planted Area (ha/yr)			
199	Tin Can Bay TWS	3.1	410						
194	Kin Kin Unreg	8.3			229				59
193	Kin Kin Unreg WH	8.3				12	13	0	2
100	N Maroochy Unreg 14.2 km+	8.3			97				32
099	N Maroochy Unreg WH 14.2 km+	0.0							
094	Browns Ck Unreg	8.3			10				1
091	N Maroochy Unreg 0 – 14.2 km	8.3			77				30
088	Rocky Ck Unreg	8.3			49				7
068	S Maroochy Unreg 37.6km+	8.3			56				20
075	S Maroochy Unreg 34.2 – 37.6 km	8.3			49				15
074	S Maroochy Unreg WH 34.2 – 37.6 km	0.0							
057	Poona TWS Extraction	3.0	5410						
053	S Maroochy Unreg 0 – 34.2 km	8.3			21				5
046	Petrie Ck Unreg 14.8 km+	8.3			113				104
043	Petrie Ck Unreg 0-14.8 km+	8.3			78				42
042	Petrie Ck Unreg WH 0-14.8 km+	8.3				2	4	0	1
039	Eudlo Ck Unreg 6.5km+	8.3			67				18
038	Eudlo Ck Unreg WH 6.5 km+	8.3				12	18	0	5
036	Eudlo Ck Unreg 0- 6.5km+	8.3			17				7
032	Maroochy Unreg	8.3			39				9
020	Mooloolah Unreg 33.2km+	8.3			15				7
015	Ewen Maddock TWS	0.0							
007	Mooloolah Diversion W TWS	0.0							
010	Mooloolah Unreg 0-33.2km	8.3			24				5

3 HOW DEMANDS ARE MODELLED FOR EACH USER TYPE

3.1 Urban Users

Urban users have been modeled as type 3.0 nodes. This node distributed an annual demand (se to the existing urban nominal allocation) according to a monthly pattern of use. The pattern of use has been derived from historical water use information or else has been set to a constant monthly pattern. Table 3.1 shows the pattern of use adopted for each urban user.

Table 3.1 Monthly Patterns for Urban Demand

Demand Location	Monthly Demand (%)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Tin Can Bay	10	7	9	7	6	5	7	9	10	10	10	11
Poona/Maroochy Water Services	10	7	7	7	7	7	8	8	9	10	9	10
Ewen Maddock	8	8	8	8	8	8	8	8	8	8	8	8
Mooloolah Diversion Weir	8	8	8	8	8	8	8	8	8	8	8	8

3.2 Unregulated Irrigation and Waterharvesting

Unregulated irrigators and waterharvesters have been modelled as type 8.3 nodes. Crop model nodes that were developed with the appropriate crop mix for each reach, and used to produce the unregulated demand files, were added into the simulation model to replace the demand files. The licensed area associated with the reach was used in the crop model. These crop model nodes were developed as outlined below.

The IQQM Calibration Report outlines the procedure taken to calibrate the crop factors.

3.3 Stock and Domestic Demands

The total volume of stock and domestic licences, 128 ML/a, in the three rivers was not considered significant enough to model.

4 STORAGE DATA

Table 4.1 shows the details of the storages included in the model, their location, the storage area curve being used for them and their full storage and dead storage volumes.

Table 4.1 Storage Details

Storage	Location	Construction Date	Area /Volume Plan	Full Storage (ML)	Dead Storage (ML)	Required Storage (ML)
Cooloolabin Dam	Rocky Creek	1977?	supplied by Maroochy SC	14200	500	77
Intake Weir	38.6 km South Maroochy River	1957		77	20	
Poona Dam	Off stream	1969		683	20	530
Wappa Dam	32.1 km South Maroochy River	1963		4615	50	
Ewen Maddock Dam	Addington Creek	1975	D9658 - Landsborough	3650	378	

5 PUMP STATION CAPACITIES

In the Maroochy River system, there are three pipelines carrying water from one dam to another. Table 5.1 shows the capacities of the pumps supplying these pipelines.

Table 5.1 Pump Capacity- Maroochy Transfers

Location	Capacity (ML/day)
Cooloolabin Dam to Intake Weir	13
Intake Weir to Poona Dam	13
Wappa Dam to Poona Dam	15.5

6 NODES WHERE FLOWS ARE TO BE EXTRACTED FROM

Table 6.1 lists the nodes where flow data will be extracted from the Maroochy, Mooloolah, and Noosa Rivers IQQM model.

Table 6.1 Mary River Nodes where Flow Data Will be Reported

Node Number	Stream / Storage	Gauging Station
199	Teewah Creek nr Coops Cnr	GS140002A
189	Noosa River End of System	
064	South Maroochy at Intake Weir	GS141007A
061	South Maroochy at Kiamba	GS141001A&B
054	South Maroochy at Yandina	GS141004A&B
098	North Maroochy at Eumundi	GS141009A
044	Petrie Creek at Nambour	GS141003A,B,C
037	Eudlo Creek at Kiels Mountain	GS141008A
030	Maroochy River End of System	
018	Mooloolah River at Mooloolah	GS141006A
008	Mooloolah River at End of System	