Amendment date: 28 June 2017

Environmental works and measures at point locations

Reference no.	Title of measure	Chowilla The Living Murray Environmental Works and Measures
	Person undertaking the measure	**South Australia, New South Wales and Victoria**
	Short description of measure	The Chowilla Floodplain works is part of a program of The Living Murray (TLM) works at icon sites along the River Murray to ensure that environmental water recovered as part of The Living Murray program is used efficiently and ecological elements are maintained. The Chowilla Floodplain project involves a major environmental regulator on the Chowilla Creek and a range of complementary works. The environmental regulator will allow flows to be managed to enable flooding across the floodplain under relatively low river flow conditions.
1.	**Confirmation**	
	Capacity of the measure to operate as a supply measure *'Supply measure' is defined in section 7.03 of the Basin Plan to mean 'a measure that operates to increase the quantity of water available to be taken in a set of surface water SDL resource units compared with the quantity available under the benchmark conditions of development'.*	Yes - the Chowilla TLM Environmental works and measures meets the definition of a 'supply measure'.
	Confirmation that the measure entered into or will enter into operation by 30 June 2024 ***Basin Plan 7.12(3)(a)***	Yes - the Chowilla TLM Environmental Works and Measures will be operational by 30 June 2024. The structures are currently undergoing testing.
	Confirmation that the measure is not an 'anticipated measure' ***Basin Plan 7.12(3)(b)*** *'Anticipated measure' is defined in section 7.02 of the Basin Plan to mean 'a measure that is part of the benchmark conditions of development'.*	Yes - the TLM program of works are not included in the benchmark conditions of development. Section 3.3.5 of the MDBA's *Benchmark conditions of development for adjustment of SDLs report* indicates that although the BP-2800 scenario included the operations of the TLM works, for the benchmark for SDL-adjustment the Basin Plan mandated that the works and their operations be removed.
	Confirmation that the proponent state(s)undertaking the measure agree(s) with the template ***Basin Plan 7.12(3)(c)*** *Joint proposals will need the agreement of all proponents*	Confirmed.
2.	**Surface water SDL resource units affected by the measure** ***Basin Plan s 7.12(4)(b)***	
	This measure identifies all surface water resource units in the Southern Basin region as affected units for the purposes of notifying supply measures. The identification of affected units does not constitute an agreement between jurisdictions on apportioning the supply contribution, which will be required in coming months.	

3.	**Details of relevant constraint measures** ***Basin Plan s 7.12(4)(c)***
	This project is not reliant on constraint measures for implementation or operation.
4.	**Date on which the meausure entered into, or will enter into, operation** ***Basin Plan s 7.12(4)(d))***
	30/06/2024
5.	**Details of the measure** ***Basin Plan 7.12(4)(a)***

	Description of the works
	The works undertaken on the Chowilla floodplain include:
	• Construction of an environmental regulator on Chowilla Creek incorporating denil and vertical slot fishways
	• Construction of ancillary structures:
	  o Woolshed Creek South regulator
	  o Woolshed Creek East regulator
	  o Chowilla Island Loop channel and channel regulator
	  o Chowilla Island Loop regulator
	• Upgrade of existing weirs on Pipeclay and Slaney Creeks to provide for more flexible operations for environmental management and incorporating combined denil and vertical slot fish passage
	• Replacement of Bank E with a rock ramp fishway
	• Replacement of Boat Creek bridge to remove flow restriction, improve fish passage and improve access
	
	A schematic of the MSM-Bigmod representation of the Chowilla floodplain is attached at **Attachment A**. Level-volume-area relationships are detailed at **Attachment C** This project is not reliant on other supply or constraint measures for implementation or operation.
	
	Hydrology and hydraulic relationships at the site
	
	A schematic of the MSM-Bigmod representation of the Chowilla floodplain is attached at **Attachment A**. Level-volume-area relationships are detailed at **Attachment C**.
	
	Flow between the river and the site is regulated at the Pipeclay and Slaney regulators. There are other unregulated flows into the site from the river (e.g. Hyperna Creek). Inflows to the site with structures open as implemented in the MSM-BigMod model are outlined below.

River Flow (ML/d)	Inflow (ML/d)
0	0
500	359.9907
1000	845.1452
1500	1128.942
2000	1330.3
2500	1486.485
3000	1614.097
3500	1721.992
4000	1815.454
4500	1897.894
5000	1971.639
10000	2456.794
15000	2740.591
20000	2941.948
30000	3635
40000	11552
50000	19469
75000	39261.5
100000	59054
150000	98639
200000	138224

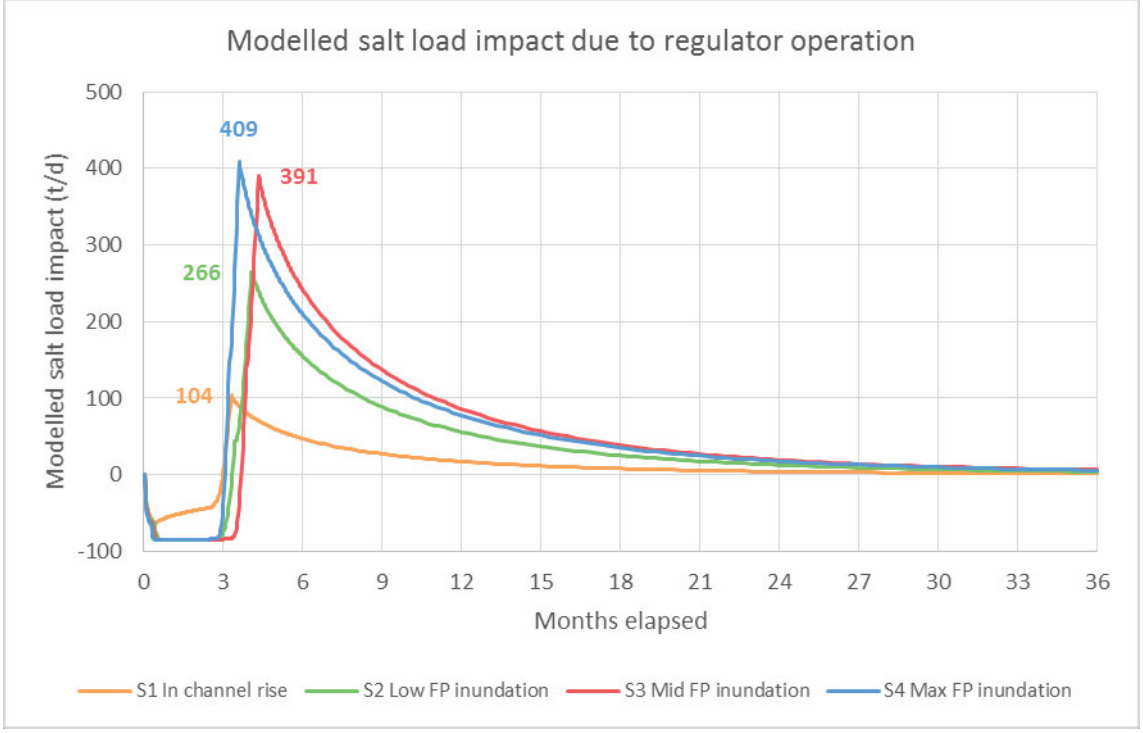
Spatial representation of the site in MSM-BigMod (Level-volume-area relationship) is provided below.

Level (m)	Volume (ML)	Area (ha)
16.2	0	0
18	0	0
19.25	10336	720
19.87	36000	3360
25	36056	3360

Once inflows to the site are calculated, the MSM-BigMod model applies hydrologic routing to calculate level, volume and inundation area. Outflow can be controlled by the Chowilla Regular, with maximum outflows presented below.

Level (m)	Discharge (ML/d)
0	0
16.2	0
16.35	1972
16.46	2222
16.66	2457
17	2706
17.4	2942
17.9	3165
18.2	3635
18.62	11552
19.05	19469
19.25	23428
19.4	27386
19.65	35303
19.85	43220
19.87	43853.36
20.1	51137
20.3	59054
20.6	74888
20.77	90722
20.9	106556
21	122390
22.04	217394

Additional salt loads have been simulated using the MODFLOW model developed and accredited for Basin Salinity Manament Strategy purposes, with the salt loads related to each level of operation provided below



Interaction between river flows and inflow into the works proposal area

Inflows to Chowilla Anabranch, Pipeclay Creek and Slaney Creek are calculated using relationships with the flow at the South Australian border (SA Flow), included in tables below. Special code has been developed to include the impacts of backwater, based on level in the Chowilla Regulator and Lock 6. At low flows the inflow to Woolshed Creek is calculated in special code, using SA Flow and levels in Chowilla Regulator and Lock 6. For SA Flows over 60,000 ML/d the inflows to Chowilla Regulator and Woolshed are based on the tables only. Floodplain retention is also modelled as a weir, with inflow to retention storage calculated in special code. The retention storage has no outflow, and any water in floodplain retention is left to evaporate.

Chowilla Anabranch	
SA Flow	**Inflow**
0	0
3000	1150
5000	1171
10000	1283
15000	1515
20000	1872
30000	2980
40000	3922
50000	4988
60000	6540
70000	10353

Pipeclay Creek	
SA Flow	**Inflow**
3000	175
3500	220
4000	330
4500	600
5500	1670
6000	2070
7000	2325
10000	2480
15000	2550
20000	2640
30000	2875
40000	3150
50000	3420
60000	4000
150000	4000

Slaney Creek	
SA Flow	**Inflow**
3000	300
3500	380
4000	515
4500	650
5500	660
6000	660
7000	660
10000	680
15000	725
20000	790
30000	960
40000	1150
50000	1370
60000	2000
150000	2000

Woolshed	
SA Flow	**Inflow**
60000	1200
80000	3576
100000	10841
120000	16055
150000	22446

Special code used to calculate flow to the Chowilla Floodplain:

Special code	Number
Chowilla Anabranch	102
Pipeclay Creek	331
Slaney Creek	332
Woolshed Creek	299
Floodplain Retention	321

Return flow from the sites to the river

Lakes

The level in the Chowilla Anabranch at offtake points for the lakes is calculated using tables below.

Lake Littra		Lake Gumflat		Lake Limbra		Lake Coombool		Werta Wert wetland	
Flow	**Level**	**Flow**	**Level**	**Flow**	**Level**	**Flow**	**Level**	**Flow**	**Level**
0	16.00	0	16.30	0	14.60	0	12.10	0	14.60
1659	17.59	1659	16.93	1659	16.44	1659	16.42	1659	16.37
3880	17.60	3880	16.99	3880	16.70	3880	16.67	3880	16.43
4419	17.71	4419	17.12	4419	16.87	4419	16.84	4419	16.61
4798	17.87	4798	17.30	4798	17.06	4798	17.04	4798	16.84
5370	18.06	5370	17.53	5370	17.31	5370	17.28	5370	17.11
7076	18.50	7076	18.05	7076	17.87	7076	17.84	7076	17.69
8828	18.89	8828	18.54	8798	18.40	8798	18.38	8798	18.24
10888	19.33	10883	19.03	10836	18.92	10836	18.90	10826	18.77
13632	19.76	13591	19.51	13526	19.43	13518	19.40	13504	19.26
17277	20.17	17226	20.00	17147	19.93	17087	19.89	17066	19.71
24533	20.48	24533	20.36	24533	20.31	24533	20.28	24533	20.14
33342	21.01	33342	20.93	33342	20.90	33342	20.88	33342	20.81
39767	21.55	39767	21.51	39767	21.49	39767	21.48	39767	21.45
54555	22.41	54555	22.53	54555	22.34	54555	22.36	54555	22.30

The level in the anabranch can be affected by backwater from Chowilla Regulator, which is modelled with special code:

Special code	Number
Lake Littra backwater	326
Lake Gumflat backwater	327
Lake Limbra backwater	328
Lake Coombool backwater	329
Werta Wert backwater	330

Once flow is converted into level using the relationships above, the river level is compared to lake level for calculating in- and outflows. The level would need to be above the sill level of the lake, for in- or outflow to occur. The flow calculation is based on the inlet capacity (presented in 0) which is defined as:

$$Q = \frac{1}{n} A R^{2/3} S^{1/2} = \frac{1}{n} A R^{2/3} \sqrt{\frac{\Delta h}{L}} = C\sqrt{\Delta h}\,;$$

where Q = flow, n = Manning's roughness coefficient, A = area of offtake channel, R = hydraulic radius, S = water surface gradient, Δh = level difference between offtake point and lake, L = length of channel and C = inlet capacity.

Lake Limbra and Werta Wert wetlands have regulators that can be closed in order to retain water in the Lakes after operations of natural high flows. The regulator status (open or closed) is calculated in Special code. When the regulator is closed the sill level of the lake is increased to the upper operation level of the regulator.

Special code	Number
Limbra regulator status	349
Werta Wert regulator status	350

Weirs

The maximum outflow from Lock 6 and Chowilla regulator is determined based on the Flow-Level relationship downstream of the weir and the target level of the weir. The Flow-Level relationships are presented in tables below.

Lock 6	
Flow (ML/d)	**Level (mADH)**
0	11.80
0	16.20
1013	16.36
5474	16.57
10095	16.88
14393	17.20
22460	17.84
30453	18.41
38144	18.93
45051	19.42
50928	19.80
53728	20.20
55880	20.83
56962	21.46
70947	22.34

Chowilla Floodplain regulator	
Flow (ML/d)	**Level (mADH)**
0	16.20
1659	16.36
3817	16.37
4351	16.53
4723	16.76
5280	17.03
6958	17.61
8635	18.16
10403	18.68
12918	19.16
16245	19.59
20272	20.05
21471	20.77
22410	21.42
30510	22.31

The outflow from Woolshed regulator is not limited by a downstream level, but is driven by the inflow to Woolshed and the target level in the weir calculated in special code.

The target levels are calculated in special code and are based on the operation of the works (i.e. as defined in the operations plan). Target level is set to normal operation level, if the works are not operated.

Special code	Number
Target Level Chowilla Regulator	103
Target Level Lock 6	104
Target Level Woolshed	302

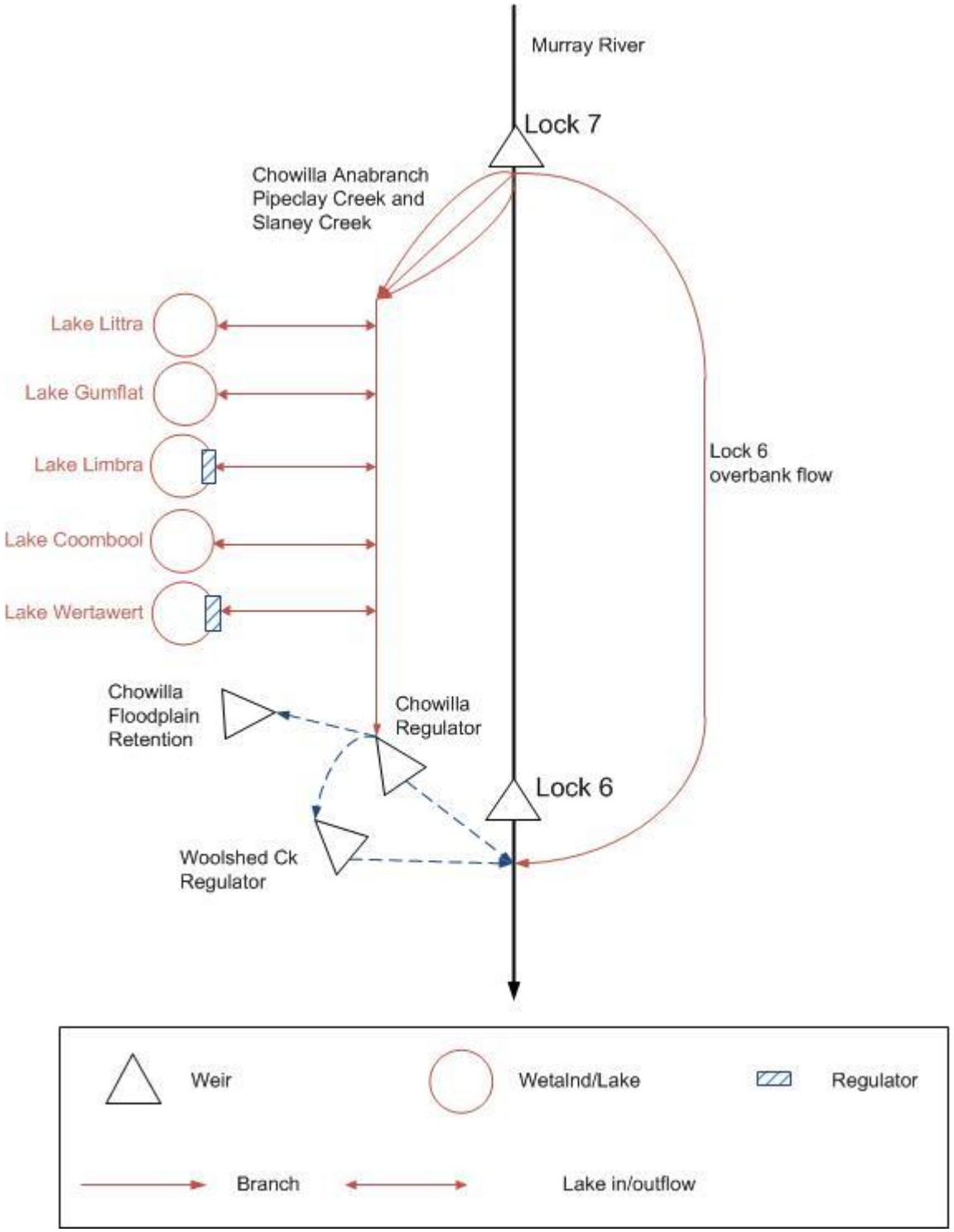
The Chowilla Floodplain Retention weir is used to simulate water retained after flooding. The weir has no outflow and water retained in the weir will evaporate.

	Surface water – loss relationship A standard evaporation loss is applied by MSM–Bigmod with evaporation and rainfall calculated using monthly data from the Lake Victoria climate station and a pan evaporation factor of 0.830. Seepage is assumed to be zero
6.	**Details of the measure**
	Spatial layers have been produced after operating regime information and updated hydrodynamic model have been used to determine the inundation areas associated with the each of the operating strategies. The total area inundated by the works operation strategies and the areas for each hydrological assessment unit, specified for EO-scoring, are provided in **Attachment D**.

Attachments

A	MDBA	Chowilla Floodplain representation in Murray model (based on Bigmod Rev 259 and MSM revision 875)
B	MDBA	Proposed operating rules for Chowilla TLM works
C	MDBA	Level-volume-area relationships
D	MDBA	Spatial data describing the inundation extent associated with the operation of the measure

Attachment A - Chowilla Floodplain representation in Murray model (based on Bigmod Rev 259 and MSM revision 875).



Attachment B – Proposed operating rules for Chowilla TLM works

Scenario				Operations		Duration			Seasonality		Inundation	
Name	Minimum Flow to SA (ML/d)	Lock 6 level (m)	Chowilla Regulator Level (m)	Average Frequency of Inundation (years)	Maximum period between operation (years)	Time to raise (days)	Minimum Duration at CR Level (days)	Drawdown time (days)	Earliest Start	Return normal CR level (16.2 mAHD)[a]	Inundated Area (ha)	Flow equivalent to surface water level at Chowilla Creek A4261001 (ML/d)
In channel Rise	7000	19.25	18	8 in 10	2	13	60	26	Start July	Start January	940	35,000
Low Floodplain Inundation	10,000	19.65	19	1 in 2	3	23	60	39			2717	50,000
Mid Floodplain Inundation	15,000	19.87	19.4	3 in 10	5	27	60	43			4317	75,000
Max Floodplain Inundation	30,000	19.87	19.8	1 in 5	8	31	30	47			7597	90,000

[a] Return to normal CR level is based on water level being within channel (ca 18.1 m AHD) at the start of December

Attachment C - Level-volume-area relationships

Lakes

Lake Littra			
Level (mADH)	**Volume (ML)**	**Area (ha)**	**Inlet capacity**
18.9	0.0	0.0	0.0
19.0	68.0	58.5	0.0
19.1	130.7	64.7	2.6
19.2	196.6	66.7	6.9
19.3	264.2	68.3	19.3
19.4	336.8	72.3	42.7
19.5	411.4	76.0	78.0
19.6	489.8	80.1	132.9
19.7	572.1	83.9	208.0
19.8	657.9	87.0	429.3
19.9	746.1	89.3	650.6
20.0	836.6	91.3	871.9
20.1	928.8	93.0	1093.2
20.2	1022.7	94.7	1314.5
20.3	1118.3	96.4	1535.7
20.4	1215.7	98.2	1757.0
20.5	1316.1	100.5	1978.3
20.6	1417.6	102.3	2199.6
20.7	1520.7	103.9	2420.9
20.8	1625.4	105.4	2642.2
20.9	1731.6	107.0	2863.5
21.0	1839.9	109.1	3084.8
21.1	1950.0	111.1	3306.0
21.2	2062.2	113.1	3527.3
21.3	2176.4	115.0	3748.6
21.4	2293.9	118.1	3969.9
21.5	2413.8	121.2	4191.2
21.7	2673.2	132.9	4633.8
21.8	2809.1	137.8	4855.0
21.9	2949.5	142.2	5076.3
22.0	3093.2	144.7	5297.6

Lake Gumflat			
Level (mADH)	**Volume (ML)**	**Area (ha)**	**Inlet capacity**
18.5	0.0	0.0	0
19.0	77.1	26.4	20
19.1	263.6	141.0	20
19.2	451.1	208.4	1000
19.3	719.4	263.5	1000
19.4	1037.0	300.1	1000
19.5	1368.4	331.8	1000
19.6	1713.0	352.4	1000
19.7	2083.2	371.0	1000
19.8	2463.5	386.6	1000
19.9	2858.5	400.7	1000
20.0	3285.7	414.4	1000
20.1	3705.5	424.0	1000
20.2	4152.2	436.5	1000
20.3	4593.7	444.8	1000
20.4	5048.2	456.8	1000
20.5	5509.3	464.4	1000
20.6	5977.7	471.5	1000
20.7	6453.3	478.4	1000
20.8	6934.7	483.8	1000
20.9	7422.0	489.8	1000
21.0	7915.2	495.8	1000
21.1	8414.3	501.7	1000
21.2	8919.5	508.1	1000
21.3	9431.7	515.1	1000
21.4	9950.6	521.6	1000
21.6	11004.6	531.1	1000
21.7	11537.6	534.4	1000
21.8	12073.7	537.4	1000
22.0	13154.4	542.9	1000

Lake Limbra			
Level (mADH)	**Volume (ML)**	**Area (ha)**	**Inlet capacity**
17.60	0	0	0
18.29	418	215	190
18.83	2006	354	450
19.36	4556	512	1400
19.90	7821	627	1600
20.10	8252	672	1800
20.36	10611	711	1800
20.92	15105	870	1800
21.51	20604	979	1800
22.31	29483	1033	1800
22.50	31417	1033	1800
23.00	36583	1033	1800

Lake Werta Wert			
Level	**Volume**	**Area**	**Inlet cap.**
16.5	0.0	0.0	0.0
17.0	0.2	0.1	0.0
17.5	23.8	14.9	0.0
18.0	150.6	35.8	0.0
18.4	295.6	46.5	0.0
18.5	357.7	51.0	36.8
18.6	438.1	61.8	75.5
18.6	446.2	62.9	89.7
18.6	454.2	64.0	115.8
18.6	462.3	65.1	173.2
18.6	470.3	66.2	327.4
18.7	478.4	67.3	537.0
19.0	759.9	90.0	7872.0
19.5	1393.9	140.0	18351.0
20.0	2327.3	212.7	28829.0
20.5	3494.7	267.4	39308.0
21.0	4971.9	311.0	49786.0
21.5	6550.8	318.0	60265.0
22.0	8149.0	321.2	70743.0

Lake Coombool			
Level (mADH)	**Volume (ML)**	**Area (ha)**	**Inlet capacity**
18.2	0.0	0.0	0.0
18.3	121.2	148.2	0.0
18.4	327.8	228.5	0.0
18.5	580.3	263.7	0.0
18.6	857.2	284.4	0.0
18.7	1151.9	300.5	0.0
18.8	1459.0	311.3	0.0
18.9	1775.1	319.4	0.0
19.0	2099.0	327.1	0.0
19.1	2435.4	338.8	0.0
19.2	2781.1	350.3	4.0
19.3	3137.9	361.0	11.0
19.4	3587.8	389.2	18.3
19.5	3985.3	403.4	52.1
19.6	4398.2	419.5	110.3
19.7	4828.8	437.6	200.9
19.8	5280.7	459.4	312.0
19.9	5765.1	482.7	423.0
20.0	6261.5	505.6	534.2
20.1	6922.6	587.9	645.3
20.2	7529.4	619.4	756.3
20.3	8164.9	645.8	867.4
20.4	8823.2	666.7	978.5
20.5	9502.1	687.0	1089.6
20.6	10199.3	704.3	1200.0
20.8	11644.8	739.3	1422.0
21.0	13207.7	810.0	1645.0
21.4	16617.0	884.6	2089.0
21.6	18421.3	914.3	2311.0
22.0	22166.8	953.1	2755.0

Weirs

Lock 6		
Level (mAHD)	**Volume (ML)**	**Area (ha)**
11.80	0	0
12.00	539	38
12.25	643	45
12.50	765	53
12.75	910	63
13.00	1084	76
13.25	1293	92
13.50	1546	111
13.75	1854	137
14.00	2234	168
14.25	2688	196
14.50	3209	221
14.73	3857	252
15.00	4635	279
15.27	5412	306
15.50	6123	325
15.75	6953	341
16.00	7822	356
16.25	8727	369
16.50	9663	381
16.75	10629	393
17.00	11624	403
17.25	12640	412
17.50	13682	423
17.75	14753	434
18.00	15850	445
18.25	16973	454
18.50	18120	464
18.75	19293	476
19.00	20499	491
19.25	21745	507
19.45	22770	523
19.50	23031	527
19.65	23830	542
19.75	24375	553
19.87	25043	570
20.00	25806	617

Chowilla Creek Regulator		
Level (mAHD)	**Volume (ML)**	**Area (ha)**
16.2	0	0
17.0	4240	306
17.5	6061	426
18.0	8676	635
18.5	12433	899
19.0	18100	1358
19.1	19582	1500
19.2	21221	1650
19.3	23033	1800
19.4	25081	2000
19.5	27450	2550
19.6	30217	2819
19.7	33395	3117
19.8	37033	3452
19.9	41147	3815
20.0	45775	4204

Woolshed Creek Regulator		
Level (mADH)	**Volume (ML)**	**Area (ha)**
16.2	0	0
18.6	1600	440
19.2	2800	570
19.4	3900	700
19.6	5300	770
19.8	7000	930
19.9	7850	1010
20.1	8862	1118
20.8	17350	1125
21.4	26067	1248
22.3	38733	1334

Chowilla Floodplain Retention		
Level (mADH)	**Volume (ML)**	**Area (ha)**
18.0	0	0
18.1	364	162
18.7	3303	1035
19.4	6728	2234
19.8	9173	2737
20.1	10500	2918
20.8	12950	3172
21.4	14071	3474
22.0	14286	3474

In addition to the Level-Volume –Area relationships for the weir pools provided above, the storage and area in the Chowilla Regulator and Lock 6 reaches are affected by flow routing and travel time, based on the tables below. An explanation of the calculation of combined reach and weir storage and area is provided in MDBA Technical Report 2015/15. There is no travel time for Woolshed and Chowilla Floodplain retention, so that storage and area are only defined by the weir pool relationship.

Lock6		
Flow (ML)	**Travel Time (days)**	**Area (ha)**
0	0	0
1095	0.3	50
7965	0.1	60
17119	0.2	70
25194	0.2	150
28868	0.2	220
35562	0.2	420
46851	0.2	600
50015	0.2	900
300000	0.2	5000

Chowilla Regulator		
Flow (ML)	**Travel Time (days)**	**Area (ha)**
0	0	0
1641	1.2	270
1860	1.5	360
2854	1.8	450
4617	2	550
6467	1.5	800
8687	1.5	870
10000	1.5	1000
12403	2	1500
17681	5	4500

Attachment D - Spatial data describing the inundation extent associated with the operation of the measure

The area of inundation associated with the operation of the works has been modelled with the hydrodynamic model.

The total area of inundation for each of the four operating strategies is given in the table below. The areas associated with the four operation strategies are nested, i.e. the area inundated when CFP2 is operated includes the area that would be inundated when operating CFP1.

Operation Strategy	**Inundation area (ha)**
In channel Rise (CFP1)	350
Low Floodplain Inundation (CFP2)	1280
Mid Floodplain Inundation (CFP3)	4560
Max Floodplain Inundation (CFP4)	6158

For the purpose of calculating scaling factors for the Ecological Outcomes scoring method, the maps of the inundation areas associated with the works were combined with maps of SFI flow bands and maps representing the ecological elements used in the scoring method. The areas for the resulting hydrological assessment units (HAU) are provided in tables below. In this case the areas for the works represent the inundation area that is *additional* to the area already inundated by a nested work.

Inundation area (ha) of HAU for CFP1	**SFI Flow Bands**					
Ecological Element	**40,000**	**60,000**	**80,000**	**100,000**	**125,000**	**>125,000**
General health and abundance - all Waterbirds	194.0	92.0	60.0	4.0	0.0	0.0
Bitterns, crakes and rails	83.0	20.8	14.6	0.3	0.0	0.0
Breeding - Colonial-nesting waterbirds	194.0	92.0	60.0	4.0	0.0	0.0
Breeding - other waterbirds	83.0	20.8	14.6	0.3	0.0	0.0
Redgum Forest	7.0	4.9	2.9	0.1	0.0	0.0
Redgum Woodlands	5.0	4.6	5.6	0.2	0.0	0.0
Forests and Woodlands: Black Box	49.6	23.9	19.8	1.9	0.0	0.0
Lignum (Shrublands)	15.2	9.7	10.5	0.0	0.0	0.0
Tall Grasslands, Sedgelands and Rushlands	83.0	20.8	14.6	0.3	0.0	0.0
Benthic Herblands	0.0	0.0	0.0	0.0	0.0	0.0
Short lived fish	83.0	20.8	14.6	0.3	0.0	0.0
Long lived fish	194.0	92.0	60.0	4.0	0.0	0.0

Inundation area (ha) of HAU for CFP2	**SFI Flow Bands**					
Ecological Element	**40,000**	**60,000**	**80,000**	**100,000**	**125,000**	**>125,000**
General health and abundance - all Waterbirds	80	606	230	1	5	8
Bitterns, crakes and rails	21	226	66	0	0	0
Breeding - Colonial-nesting waterbirds	80	606	230	1	5	8
Breeding - other waterbirds	21	226	66	0	0	0
Redgum Forest	6	7	1	0	0	0
Redgum Woodlands	9	7	3	0	0	0
Forests and Woodlands: Black Box	28	116	65	1	2	3
Lignum (Shrublands)	12	350	165	0	4	0
Tall Grasslands, Sedgelands and Rushlands	21	226	66	0	0	0
Benthic Herblands	0	0	0	0	0	0
Short lived fish	21	226	66	0	0	0
Long lived fish	80	606	230	1	5	8
Inundation area (ha) of HAU for CFP3	**SFI Flow Bands**					
Ecological Element	**40,000**	**60,000**	**80,000**	**100,000**	**125,000**	**>125,000**
General health and abundance - all Waterbirds	206	1,403	1,596	37	14	24
Bitterns, crakes and rails	43	138	262	2	0	3

Breeding - Colonial-nesting waterbirds	206	1,403	1,596	37	14	24
Breeding - other waterbirds	43	138	262	2	0	3
Redgum Forest	20	38	6	0	0	0
Redgum Woodlands	35	92	29	1	0	0
Forests and Woodlands: Black Box	68	567	482	9	4	7
Lignum (Shrublands)	23	584	968	21	8	3
Tall Grasslands, Sedgelands and Rushlands	42	131	262	2	0	3
Benthic Herblands	1	7	0	0	0	0
Short lived fish	43	138	262	2	0	3
Long lived fish	206	1,403	1,596	37	14	24

Inundation area (ha) of HAU for CFP4	**SFI Flow Bands**					
Ecological Element	**40,000**	**60,000**	**80,000**	**100,000**	**125,000**	**>125,000**
General health and abundance - all Waterbirds	36	222	1,304	14	2	20
Bitterns, crakes and rails	7	18	106	3	0	0
Breeding - Colonial-nesting waterbirds	36	222	1,304	14	2	20
Breeding - other waterbirds	7	18	106	3	0	0
Redgum Forest	3	23	2	0	0	0
Redgum Woodlands	13	44	7	0	0	0
Forests and Woodlands: Black Box	11	89	432	7	1	4
Lignum (Shrublands)	1	29	660	2	1	5
Tall Grasslands, Sedgelands and Rushlands	7	18	106	3	0	0
Benthic Herblands	0	0	0	0	0	0
Short lived fish	7	18	106	3	0	0
Long lived fish	36	222	1,304	14	2	20