

MOKOAN - RETURN TO WETLANDS					
SUMMARY OF OFFSET PACKAGES TO PROVIDE AT LEAST 91% RELIABILITY					
No.	OFFSET	Package			
		A	B	C	D
1	<b>Tungamah Pipeline</b> (incl. 140ML earthen storage, pump station from the East Goulburn Main Channel and 360 km pipeline distribution system, supplying 650 services over an area of 63,000 ha)	√	√	√	√
2	<b>Mawson/Burnbrae Entitlement Purchase</b> (incl. purchase of 1000ML of entitlement from a property at Nalinga in 2004)	√	√	√	√
3	<b>Remote Control and Monitoring of L.Nillahcootie</b> (incl. remote monitoring of storage inflows and outflows and remote control of the Nillahcootie outlet valve operation)	√	√	√	√
4	<b>Remote Control and Monitoring of Broken River Weirs</b> (incl. remote monitoring of inflows and outflows and remote control of regulating structure operation at Broken Weir, Hollands Weir, Casey's Weir)	√	√	√	√
5	<b>Remote Control and Monitoring of Broken Creek Weirs</b> (incl. remote monitoring of inflows and outflows and remote control of regulating structure operation at Flynn's, Trewin's, Waggarendall Weirs)	√	√	√	√
6	<b>Flow Monitoring of Catchment Streams</b> (incl. provision of remote monitoring of flows at Moorngag, Lima East Creek and Orrvale)	√	√	√	√
7	<b>Dynamic Real-time Monitoring of Irrigation Diversion Flow Meters</b> (incl. provision of up to 100 upgraded flow meters complete with remote sensing and alarming capability)	√	√	√	√
8	<b>Rain rejection storage Lake Mokoan inlet channel (300ML capacity)</b> (incl. provision of a new regulating weir on the Inlet Channel near Hollands Weir, modifications to existing channel structures and remote monitoring and control equipment. Provides 300 ML storage capacity which can capture "surplus" river flows during the irrigation season and release these at a later time, rather than release from Nillahcootie. System includes retention of Broken and Holland's Weirs and utilises both weir pools for temporary storage purposes)	√	√	√	√
9	<b>Supply into Broken River downstream of EGM</b> (incl. a new 30ML/d regulating structure located adjacent to the existing Broken River Outfall on the East Goulburn Main Channel, to supply 14 diverters between the EGM and Shepparton)	√	√		√
10	<b>Pump Station and Pipeline to supply irrigation diversions 2km upstream of EGM to Violet Town Boundary Rd from EGM</b> (incl. supply to 3 diverters, 2.1 km of pipeline up to 375 dia at 24 ML/d)	√			
11	<b>Piped of Supply to Major Creek Area</b> (incl. pump station from the Broken Creek and 2.6 km pipeline distribution system, supplying 3 services)	√			
12	<b>Off-line Storage within Broken Creek System</b> (Below ground off-line storage with capacity of 100 ML near Trewins Weir. This includes inlet channel and structure, a pump station at the outlet and an outlet channel)				√
13	<b>Off-line Storage within Broken Creek System</b> (Below ground off-line storage with capacity of 200 ML near Trewins Weir. This includes inlet channel and structure, a pump station at the outlet and an outlet channel)	√			
14	<b>Supply to diverters d/s of EGM via Shepparton Irrigation Area channel system</b> (incl options of gravity pipelines, pumped pipeline, farm channel extensions or upgrades, all from various existing SIA supply channels).			√	
15	<b>Supply of 1000ML of Operational Loss from EGM rather than Lake Nillahcootie</b> (provides for minimum operating flows required by lower Broken diverters to be released from the EGM, rather than Nillahcootie)				√
16	<b>Pump Station and Pipeline to supply irrigation diversions 6.5 km upstream of EGM to Keally's Rd from the EGM</b> (incl. pump station to supply to 15 diverters, 8.4 km of pipeline up to 750 dia at 60 ML/d)		√		
17	<b>Pump Station and Pipeline to supply irrigation diversions 6.5 km upstream of EGM to Keally's Rd from the EGM and Pump Station and Pipeline to supply irrigation diversions 7 km downstream of Gowangardie Weir from Gowangardie Weir.</b> (incl. pump station to supply to 15 diverters, 8.4 km of pipeline (u/s of EGM) up to 750 dia at 60 ML/d and pump station to supply to 9 diverters, 16.9 km of pipeline (d/s of Gowangardie) up to 600 dia at 44 ML/d. Also includes, provision for the pump station to supply water into the East Shepparton D&S channel at Gowangardie Weir and possible extension of upstream diversion pump suction)			√	√
<b>Operational Offsets</b>		√	√	√	√
<b>Additional Broken Entitlement Purchase (ML)</b>		4640	3160	1600	1150
<b>Budget Required for Reliability Offset Package</b>		36.5	38.0	45.0	45.5

**MOKOAN - RETURN TO WETLAND PROJECT**  
**BROKEN SYSTEM RELIABILITY**  
**OFFSETS NOT INCLUDED IN FINAL PACKAGE/S**

No.	OFFSET MEASURE	CAPITAL COST	RELIABILITY IMPROVEMENT	COST of RELIABILITY	Reasons for not including in recommended Packages
		\$m	ML	\$ '000/ML	
1	Nillahcootie Raising	15.0	1800	8.3	Requires significant dam safety upgrade to allow raising of the current embankment by 1m to provide 5GL extra storage. Cost of this option found to be significantly greater than that assumed in the White Paper. Cost increase exposed only after completion of dam design review and risk assessment. Very high cost per ML of water saved.
2	East Shepparton Pipelining	3.9	800	4.9	Investigation to assess merits of pipelining all of the existing East Shepparton D&S system. Relatively high cost for a saving of 800 ML. Very low level of customer acceptance of the proposed pipelining option. A number of environmental issues associated with the abandonment of the existing supply infrastructure lead to a medium level of environmental impacts being assessed.
3	Pipeline supply to Lower Broken u/s of EGM to Gowangardie	32.7	6235	5.2	Excessive capital and recurrent costs. Major infrastructure investment with uncertainty over level of future utilisation
4	Broken Ck Off-stream Storage [500ML]	5.2	500-1000(e)	10.4 - 5.2	High cost per ML saved. Reliability benefit difficult to determine
5	Broken Ck Off-stream Storage [400ML]	4.4	400-800(e)	11.0 - 5.5	High cost per ML saved. Reliability benefit difficult to determine
6	Broken Ck Off-stream Storage [300ML]	3.8	500 - 750 (e)	7.6 - 5.1	High cost per ML saved. Reliability benefit difficult to determine
7	Broken Ck On-stream Storage [37ML]	0.6	40 -120(e)	15 -5	High cost per ML saved. Reliability benefit difficult to determine
8	Broken Ck Pipeline d/s Caseys	34.0	3300 (e)	10.3	High cost per ML saved. Reliability benefit difficult to determine
9	Broken Ck Pipeline d/s Trewins	16.8	500 -1000 (e)	33.6 - 16.8	High cost per ML saved. Reliability benefit difficult to determine
10	Broken Ck Pipeline d/s Flynnns	8.3	500 - 750 (e)	16.6 - 11.1	High cost per ML saved. Reliability benefit difficult to determine
11	Broken Ck Channel	15.4	1000 - 2000 (e)	15.4 - 7.7	High capital costs and increased recurrent costs and unable to determine loss reduction benefit
12	Provision of a mid System Storage [5,000 ML]	35.7	4500	7.9	Extremely high capital costs, adverse impacts on future Wetland, significant reduction in overall project water savings (approx 42GL)
13	Provision of a mid System Storage [10,000 ML]	54.4	9000	6.0	Extremely high capital costs, adverse impacts on future Wetland, significant reduction in overall project water savings (approx 34GL)
14	Provision of a mid System Storage [20,000 ML]	81.8	15500	5.3	Extremely high capital costs, adverse impacts on future Wetland, significant reduction in overall project water savings (approx 30GL)
15	Rain Rejection Storage (Outlet Channel 80ML)	0.5	200	2.5	Limited level of water savings and relatively high operating costs due to need to pump stored water back into the Casey's weir Pool. Complex operational requirement to achieve maximum efficiency
16	Raising Gowangardie Weir	2.8	100 -150 (e)	28.0 -18.7	Existing structure safety and fish passage concerns compounded. Increase in flood risk to upstream properties, significant adverse environmental impacts anticipated.

(e) = Estimated Figures