

SUMMARY OF SHORTLISTED OPTIONS FOR CALLIDE DAM (WATER SUPPLY DAM) – FOR FLOOD ATTENUATION BENEFITS

NO.	OPTION SUMMARY	DESCRIPTION	ADVANTAGES	DISADVANTAGES
1	<p>Maintain existing automatic operations</p> <p>+ enhanced messaging based on additional early warning triggers</p> <p>+ improved coordination with LDMG</p>	<ul style="list-style-type: none"> Maximum operating level (MOL) of dam to match full supply level (FSL) at 216.1m – i.e. up to 100% normal capacity Spillway gates to open automatically once level reaches FSL, and progressively open or close as level changes Currently operating at reduced MOL (95% capacity) due to dam safety monitoring exercise (will continue as long as monitoring is required) 	<ul style="list-style-type: none"> Equipped for all operating conditions, including cyclones (as no manual gate operation required during event) No impact on water supply availability Least cost (nil) 	<ul style="list-style-type: none"> Least flood attenuation benefits of shortlisted options (though still better than if no dam present)
2	<p>Lower maximum operating level (MOL) to 90%</p> <p>(utilise fully automatic gate operations)</p>	<ul style="list-style-type: none"> Lower MOL to 215.0m (90%) to provide some 'air space' or flood storage (10% = 13,600ML) When level rises above MOL, slowly release water from the outlet pipes to bring level back to MOL If level continues to rise (inflows exceed outlet valve capacity), water will fill to FSL and gates will commence automatic operation 	<ul style="list-style-type: none"> Provides additional flood storage up to 13,600ML (10%) Minor benefit to immediate downstream area No requirement for human intervention during event (no manual gate operations, except to reduce to 90% capacity after event) Least cost (nil) 	<ul style="list-style-type: none"> Possible very minor impact on customer supply/reliability (<1%), though essentially negligible No benefit for large volume floods (such as in 2013) No measurable benefit to flooding downstream of Biloela to Jambin Does not reduce risk of gates automatically opening and ramping-up to peak outflows over a short duration
3	<p>Maximum operating level (MOL) at 100%</p> <p>+ make early releases based on actual rainfall on the ground</p> <p>(utilise simple manual gate operations for early releases, fixed at 266m³/s = 23,000 ML per day)</p>	<ul style="list-style-type: none"> Make early 'event releases' at start of rain event Manually operate gates to allow early releases of water capped at 266m³/s (a rate at which downstream flows remain within the banks of Callide Creek) Manual gate operation dependant on: <ul style="list-style-type: none"> Real (not predicted) rainfall recorded in dam catchment Significant event forecast (modelling predicts FSL will be reached) Dam level is above a nominated minimum trigger level (eg. 70%) to reduce risk of unnecessary releases Revert to automatic gate operations if dam level exceeds FSL 	<ul style="list-style-type: none"> May provide additional storage through early releases (4-10%) by delaying dam from reaching FSL Provides early visual warning of flows in the creek May provide some reduction in peak flood velocities immediately downstream of dam Modelling on 2015 event shows a reduction in maximum dam outflow from 4,000 to 3,500m³/s – though a lesser benefit on flood depths to immediate downstream area No impact on customer supply/reliability 	<ul style="list-style-type: none"> Requires conditions to be safe for manual gate operation Minor gate alterations may be required (approximately \$250,000 to \$400,000) to allow improved control, and to operate remotely in all weather conditions No benefit for large volume floods (such as 2013) No measurable benefit to flooding downstream of Biloela to Jambin
4	<p><i>Combines Options 2 & 3:</i></p> <p>Reduced maximum operating level (MOL) of 90%</p> <p>+ make early releases based on actual rainfall on the ground</p> <p>(utilise simple manual gate operations for early releases, fixed at 266m³/s = 23,000 ML per day)</p>	<ul style="list-style-type: none"> Lower MOL to 90% Commence early 'event releases' at start of rain event (as per Option 3) Revert to automatic gate operations if dam level exceeds FSL 	<ul style="list-style-type: none"> Potentially some improved benefit over Options 2 and 3, but marginal (essentially very similar to either option on it's own), and still limited to immediate downstream area Outflows at 266m³/s remain within the bed and banks of creek 	<ul style="list-style-type: none"> May require minor gate improvements to allow operation in all weather conditions (as per Option 3) No benefit for large volume floods (such as 2013) No measurable benefit to flooding downstream of Biloela to Jambin Possible very minor impact on customer supply/reliability (<1%), though essentially negligible
5	<p>Option 4 + enhanced manual gate operations to match outflows with inflows</p>	<ul style="list-style-type: none"> Lower MOL to 90% Make early 'event releases' at start of rain event Manually operate gates, as per Option 3 to allow early releases, but allowing for stepped outflows to increase to match increasing inflows into the dam <ul style="list-style-type: none"> May increase outflows above 266m³/s (23,000 ML/day), up to 800m³/s (69,000 ML/day) Improved hydrologic modelling to mitigate potential impacts and confirm gate operations/outflow Other triggers/rules as for Option 3 Revert to automatic gate operations if dam level exceeds FSL 	<ul style="list-style-type: none"> Reduced flood peaks may provide better flood attenuation immediately downstream Peak flows from Callide Dam typically arrive downstream ahead of peak Kroombit flows – early higher releases will further assist ("spreading" flood out over a longer time, rather than combining as an increased peak) Gives best opportunity for benefits further downstream, though still very limited to negligible, and will result in slightly longer duration flooding. 	<ul style="list-style-type: none"> Gate improvements required (approximately \$2,000,000), plus additional costs (flood manual procedures, approvals) More complex gate operations and/or greater potential for human error Reduced flood peaks, but need to manage risk of 'pre-charging' or flooding downstream areas (from higher early releases), if modelling inaccurate (for smaller floods) Very minor benefit for large volume floods (such as 2013) No measurable benefit to flooding downstream of Biloela Possible very minor impact on customer supply/reliability (<1%), though essentially negligible