Process Step (from flow diagram)	Through what hazardous event might hazards be introduced or pass into recycled water?	Which are the most important hazards?	Which risk endpoint was assessed?	Likelihood (A-E)	Impact (1 to 5)	Max Risk	What preventive measures are considered to be in place when assessing this risk?	Responsibility	Likelihood (A-E)	Impact (1 to 5)	Resi-dual Risk	Follow-up Actions	Priority (timeframe)	Notes and comments
Sewer catchment	Hazardous substance illegally dumped into sewer	Potentially any hazard	Environment	C	2	Moderate	• Limited high hazard inputs - workshop area. • Grease trap. • Oil separator. • Primary screen. • Training and awareness and education of personnel on site. • Contingency plan at the STP: recirculate within the STP and if that fails, move to pump out contingency.	SSR	B	2	Low			It is possible foreseeable that a hazardous substance could affect final water quality directly due to workshops on site but these are not industrial or hazardous commercial wastes.
Sewer catchment (continued)	Pathogens from domestic sewage	Pathogens	Health	E	4	Very High	• Four validated CCPs (MLE, MBR, UV and chlorine) providing sufficient pathogen reduction. • Contingency plan at the STP: recirculate within the STP and if that fails, move to pump out contingency. • Exposure controls (as provided to the snow making team in their operating guide on timing of snow making and backed up by training to cover direction and timing of spray). • Plumbing controls as per Plumbing Code of Australia and AS/NZS 3500 in the toilet block.	SSR	A	4	High			High risk customers (e.g. aged care and healthcare facilities) not exposed. There are potential drinking water users downstream since some snowmelt or recycled water from leaking pipes may flow to drinking water sources both at SSR and tens of km downstream. The resort is a 'day resort' at present without night-skiing. Most activity is 8-4 daytime. No pressure or intent to make snow during those daytime hours.
Sewer catchment (continued)	General process failure for a range of possible reasons such as power failure	Any	Any	B	4	High	• Don't supply recycled water during such events. • Pollution Incident Response Management Plan. • Reliability and robustness planning, e.g. contingency planning for power or physical accessibility issues.	SSR	A	4	High			
Sewer catchment (continued)	Extreme flow inputs overwhelming plant capacity	Pathogens	Health	B	4	High	• Don't supply recycled water during such events. • MBR system limits capacity through recycled water plant.	SSR	A	4	High			
Primary treatment and grease trap	Failure to adequately clean and maintain system	Physical	Environment	A	2	Low	• MBR system would foul before recycled water impacted. • Maintenance and operations management plan. Incorporated in the Operating Plans from De•mem.	SSR	A	2	Low			
MLE	Poor performance of MLE system leading to excessive ammonia and inability to disinfect	Pathogens	Health	C	4	Very High	• Online process monitoring with automated controls on MLE and free chlorine monitoring to prevent recycled water supply if disinfection is inadequate. • Exposure controls (timing of snow making and plumbing controls in toilet block).	SSR	A	4	High			High risk customers (e.g. aged care and healthcare facilities) not exposed.
MLE (continued)	Bypass of treatment process	Pathogens	Health	C	4	Very High	• Absence of bypass valves.	SSR	A	1	Low			The consequence has been changed since there isn't a bypass valve - this risk is engineered out.
MBR	Poor performance of MBR leading to pathogen breakthrough and/or excessive turbidity and inability to disinfection	Pathogens	Health	C	4	Very High	• Online process monitoring with automated controls on MBR and turbidity, UV intensity and free chlorine to prevent recycled water supply if disinfection is inadequate. • Multiple barrier process (three other CCPs). • Contingency plan at the STP: recirculate within the STP and if that fails, move to pump out contingency. • Exposure controls (as provided to the snow making team in their operating guide on timing of snow making and backed up by training to cover direction and timing of spray). • Plumbing controls as per Plumbing Code of Australia and AS/NZS 3500 in the toilet block.	SSR	A	4	High			
MBR (continued)	Bypass of treatment process	Pathogens	Health	C	4	Very High	• Absence of bypass valves.	SSR	A	1	Low			The consequence has been changed since there isn't a bypass valve - this risk is engineered out.
UV	Failure to meet required disinfection e.g. due to loss of dosing from lamp failure, fouling, reduced UVT or control system error	Pathogens	Health	C	4	Very High	• Online process monitoring with automated controls on UV system including UV intensity to prevent recycled water supply if disinfection is inadequate. • Multiple barrier process (three other CCPs). • Exposure controls (timing of snow making and plumbing controls in toilet block).	SSR	A	4	High			High risk customers (e.g. aged care and healthcare facilities) not exposed.
UV (continued)	Bypass of treatment process	Pathogens	Health	C	4	Very High	• Absence of bypass valves.	SSR	A	1	Low			The consequence has been changed since there isn't a bypass valve - this risk is engineered out.

Process Step (from flow diagram)	Through what hazardous event might hazards be introduced or pass into recycled water?	Which are the most important hazards?	Which risk endpoint was assessed?	Likelihood (A-E)	Impact (1 to 5)	Max Risk	What preventive measures are considered to be in place when assessing this risk?	Responsibility	Likelihood (A-E)	Impact (1 to 5)	Resi-dual Risk	Follow-up Actions	Priority (timeframe)	Notes and comments
Chlorination	Failure to meet required disinfection e.g. due to loss of dosing	Pathogens	Health	C	4	Very High	• Online process monitoring with automated controls on chlorination system including free chlorine residual, turbidity, pH and flow rate to prevent recycled water supply if disinfection is inadequate. • Multiple barrrier process (three other CCPs). • Contingency plan at the STP: recirculate within the STP and if that fails, move to pump out contingency. • Exposure controls (as provided to the snow making team in their operating guide on timing of snow making and backed up by training to cover direction and timing of spray). • Plumbing controls as per Plumbing Code of Australia and AS/NZS 3500 in the toilet block.	SSR	A	4	High			
Chlorination (continued)	Bypass of chlorination process	Pathogens	Health	C	4	Very High	• Absence of bypass valves.	SSR	A	1	Low			The consequence has been changed since there isn't a bypass valve - this risk is engineered out.
Chlorination (continued)	Overdosing of chlorine resulting in higher contcentrations in discharges than modelled	Chlorine and disinfection by products	Environment	C	2	Moderate	• Online process monitoring with automated controls including free chlorine residual with upper limiting bound on chlorine levels heading to the quarry • OEMP • Verification monitoring monthly to keep and inform active management of chlorine levels in the Quarry Dam.	SSR	C	2	Moderate		Post workshop action.	The main concern is likely to be in the quarry dam. The chlorine residual needs to be sufficient for to reach the toilet block and achieve the primary kill.
Recycled water tank	Contamination of recycled water in the water storage due to ingress	Pathogens	Health	B	3	Moderate	• The storage is not accessible to polluting processes other than natural inputs, such as birds.	SSR	A	3	Low			Any contamination would only be at background levels making the influence of recycled water relatively insignificant
Recycled water tank	Loss of chlorine	Slimes	Health	D	3	High	• Recirculation system	SSR	A	3	Low			
Quarry dam	Contamination of recycled water in the dam storage due to ingress	Pathogens	Health	B	3	Moderate	• The storage is not accessible to polluting processes other than natural inputs, such as birds.	SSR	A	3	Low			Any contamination would only be at background levels making the influence of recycled water relatively insignificant
Quarry dam (continued)	Contamination of recycled water in the dam storage due to growth	Cyanotoxins	Health	C	2	Moderate	• The storage is a alpine altitude so not warm. • The risk is not directly controlled but is managed through monitoring and response as part of the verification monitoring program.	SSR	B	2	Low			The quarry must maintain a base level for firefighting The additional nutrient input from recycled water is small in a relative sense (to be quantified in the dilution studies), so is an inherent risk for the standing water Lining is not intended based on the level of dilution expected
Quarry dam (continued)	Concentration of substances in the recycled water during periods of non-use	Parameters such as salt and corrosivity factors	Health	C	2	Moderate	• The quarry dam would have some turnover for irrigation, albeit limited by the need to maintain fire storage • The quarry dam would be charged from the Clear Creek to maintain its level which would dilute recycled water	SSR	B	2	Low			The quarry must maintain a base level for firefighting De•mem assessed corrosivity (to be confirmed)
Quarry dam (continued)	People swimming in the dam	Pathogens and cyanotoxins	Health	C	2	Moderate	• The storage is a alpine altitude so not warm. • Signage. • Operator huts at the top of Racecourse, adjacent to the quarry.	SSR	B	2	Low			• Location not in an attractive one for swimming. • Surface sprinklers used in winter helps to aerate the dam and they could be run in summer if required.
Distribution of recycled water at the SSR	Recycled water leaking from pipelines and getting into drinking water sources via offtakes at weirs or bores	Pathogens	Health	C	4	Very High	• Recycled water treated to high grade. • QAP for drinking water supply system.	SSR	A	4	High	Update the SSR QAP to cover recycled water snow runoff - including testing of potable water to cover parameters of relevance to recycled water. Use a mass balance approach to review the site and situation and consider the need for a yearly monitoring program relating groundwater and soil to provide evidence relating to long-term cumulative impacts.	Post workshop action.	For the Resort: the potable water extraction point is relatively high up in the resort so would not capture most of the recycled water from any leaking pipes or snow run-off, but it would capture some of the recycled water snow runoff. Potable water extraction can be timed to limit snow melt exposure. This needs addressing in the drinking water QAP [being updated at time of writing]. Other potable water sources are many tens of km downstream. Clear Creek converges with two other larger waterways - the nearest downstream bores are thought to be approximately tens of km downstream. Dilution should reduce the concentrations of salts, the balance of salts, nitrates, and other possible hazards to levels acceptable for potwable water sources downstream.
Distribution of recycled water at the SSR (continued)	Cross-connections or misconnections from recycled water distribution lines into potable water supplies.	Pathogens	Health	C	4	Very High	• Recycled water treated to high grade. • QAP for drinking water supply system. • Plumbing controls as per Plumbing Code of Australia and AS/NZS 3500 in the toilet block.	SSR	A	4	High			Only one recycled water pipe feeding the toilets - not multiple pipes or balance tanks. Recently and newly constructed. Includes 'purple pipes' etc.

Process Step (from flow diagram)	Through what hazardous event might hazards be introduced or pass into recycled water?	Which are the most important hazards?	Which risk endpoint was assessed?	Likelihood (A-E)	Impact (1 to 5)	Max Risk	What preventive measures are considered to be in place when assessing this risk?	Responsibility	Likelihood (A-E)	Impact (1 to 5)	Resi-dual Risk	Follow-up Actions	Priority (timeframe)	Notes and comments
Distribution of recycled water at the SSR (continued)	Major spill or leak of recycled water from pipelines	Pathogens	Environment	C	2	Moderate	• Recycled water treated to high grade. • OEMP	SSR	A	2	Low			
Distribution of recycled water at the SSR (continued)	Biofilms and microbial growth in network	Pathogens	Health	C	3	High	• Exposure controls.	SSR	A	3	Low			
Distribution of recycled water at the SSR (continued)	Major spill or leak of recycled water from pipelines, impacting on groundwater or surface waters	Chlorine and disinfection by products	Environment	C	2	Moderate	OEMP	SSR	B	2	Low			
Recycled water application for snow making	Recycled water seeping into groundwater and then carrying pathogens or nitrates to drinking water bores or otherwise impacting the aquifer	Pathogens and chemicals	Health	C	4	Very High	• Recycled water treated to high grade. • QAP for drinking water supply system.	SSR	A	4	High	Update the SSR QAP to cover recycled water snow runoff - including testing of potable water to cover parameters of relevance to recycled water. Use a mass balance approach to review the site and situation and consider the need for a yearly monitoring program relating groundwater and soil to provide evidence relating to long-term cumulative impacts.	Post workshop action.	For the Resort: the potable water extraction point is relatively high up in the resort so would not capture most of the recycled water from any leaking pipes or snow run-off, but it would capture some of the recycled water snow runoff. Potable water extraction can be timed to limit snow melt exposure. This needs addressing in the drinking water QAP [being updated at time of writing]. Other potable water sources are many tens of km downstream. Clear Creek converges with two other larger waterways - the nearest downstream bores are thought to be approximately tens of km downstream. Dilution should reduce the concentrations of salts, the balance of salts, nitrates, and other possible hazards to levels acceptable for potwable water sources downstream.
Recycled water application for snow making (continued)	Public being exposed to recycled water during snow making whilst on site, e.g. whilst cannons are spraying or eating snow	Pathogens	Health	B	4	High	• Recycled water treated to high grade and is fit for unrestricted use (e.g. firefighting). • Signage and awareness raising at the site.	SSR	A	4	High			Application will inherently be timed to minimise exposure when people are using the sites (e.g. on cold nights).
Recycled water application for snow making (continued)	Workers being exposed to recycled water during its application and system maintenance	Pathogens	Health	A	3	Low	• Recycled water treated to high grade and is fit for unrestricted use (e.g. firefighting). • Signage and awareness raising at the site. • Inducation of staff and contracators at site mentioning recycled water.	SSR	A	3	Low			

Process Step (from flow diagram)	Through what hazardous event might hazards be introduced or pass into recycled water?	Which are the most important hazards?	Which risk endpoint was assessed?	Likelihood (A-E)	Impact (1 to 5)	Max Risk	What preventive measures are considered to be in place when assessing this risk?	Responsibility	Likelihood (A-E)	Impact (1 to 5)	Resi-dual Risk	Follow-up Actions	Priority (timeframe)	Notes and comments
Recycled water application for snow making (continued)	Excessive application of recycled water impacting nearby enviroment	Nutrients	Environment	C	2	Moderate	• Recycled water treated to high grade. • Contingency plan at the STP: recirculate within the STP and if that fails, move to pump out contingency. • Daily nitrogen testing at the STP. • OEMP	SSR	A	2	Low	Flesh out in more detail how that relates to environmental risks including mass balance and ongoing monitoring of nutrient-sensitive natives or responsive weeds. Mainly need to add a bit more on impacts on terrestrial aspects such as flora, to a lesser extent fauna, and soils. The current focus is on aquatic envirionment.	Post workshop action.	A general requirement: given the timing, a Statement of Commitments is required to demonstrate an intent to deliver on conditions post consent. This would cover various commitments made at this stage. In relation to the legislative requirement to consider the impact on flora and fauna, assessments of some sort are required. One way to do that is to establish a baseline upfront before 'go live'; then after the go live a long-term monitoring program to review those same transects. A specific and specialised flora and fauna assessment report (considering the endangered and sensitive native ecological communities including in Clear Creek) would be required, (e.g. based on the existing information and previous assessments undertaken in the area such as the existing assessments by Dave Woods), albeit needing a quick update and refresh as part of the DA to establish that initial baseline. This can potentially be incorporated into the SEE. Then that can be built upon over time through a monitoring program covering flora, fauna and soils - that can be post DA conditioning. As an alternative assessment framework, the recycled water guidelines provide an approach that considers the concentrations and application loads of stressors and compares those to thresholds for environmental impacts based on environmental reference values. The guidelines refer to 'key hazards' and consider the reference values for acute and cumulative application of recycled water on a range of flora and on soils. Consider timing and location of irrigation and snow making. Consider wind. In addition, an approach is to compare to a baseline condition of using potable water. Referring to for instance s6.1 in the Biodiversity and Conservation Reg to consider flora and fauna and biodiversity. The logical 'test' to be applied when submitted the DA is whether the recycled water has potential impacts and, if not, why not? If there is significant uncertainty, what monitoring and testing is required to resolve that uncertainty? What is the difference, is the change 'material'? If so, is it not significant? Native veg and aquatic life. First talk to Dave Woods. See if he has enough to provide a baseline. Feed back into the flora and fauna is there, what is threatened, and what soils are there.