



ANNUAL REPORT 2019-20

DRINKING WATER SUPPLY

MT BULLER & MT STIRLING ALPINE RESORTS



Mt Buller Mt Stirling Alpine Resort Management Board
Alpine Central, Summit Road, Mt Buller, Victoria Australia
Phone 03 5777 6077 - Fax 03 5777 6219
Email info@mtbuller.com.au - Website www.mtbuller.com.au

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1. Overview

The Mt Buller & Mt Stirling Resort Management Board (RMB) is committed to providing safe drinking water in accordance with Section 17 of the *Safe Drinking Water Act 2003* (the Act), the Safe Drinking Water Regulations 2015 (the Regulations), and the Department of Health & Human Services Water Quality Annual Report Guidance. This 2019-2020 Drinking Water Quality Annual Report has been prepared in accordance with those requirements and provides information on the quality of drinking water provided by the RMB. This report is provided to the Secretary to the Department of Health & Human Services and is available to the public via the RMB website www.rmb.mtbuller.com.au.

The RMB is a State Government entity established in accordance with the *Alpine Resorts (Management) Act 1997* to manage the Mt Buller & Mt Stirling Alpine Resorts. This includes the provision of drinking water, and the RMB is prescribed as a water supplier under the Act.

The Mt Buller Resort is located approximately 220km from Melbourne. The Village is positioned above the typical snowline at an elevation of 1,500m and has approximately 8,000 beds. There is a base population of about 1,600 people and more than 450,000 visitor days* during each snow season. Peak visitation is on weekends and during school holidays. There may be up to 17,000 people in the resort during any one day. In contrast, the permanent population during the non-snow season drops to about 30 people. A further 100 - 150 people work on the mountain during summer, including RMB and lift company staff, some accommodation and food & beverage providers, as well as builders and construction workers. Activities are held to attract visitors, and there are approximately 100,000 visitor days during the non-snow season.

The RMB has licences to draw up to 700ML p.a. (665 ML at Boggy Creek, 30 ML at Howqua, 3 ML at Mirimbah and 2 ML at TBJ at Mt Stirling). Water for the Mt Buller Alpine Village comes from 3 sources - Boggy Creek, the 'Headwaters' and the 'Catchment Weirs'.

Mt Stirling Resort has a common boundary (the Delatite River) with the Mt Buller Resort, and Mirimbah is the entrance point for both. Mt Stirling is a nature based resort and has no permanent population or accommodation. It has a small building used by RMB staff, cross country ski hire and cafe, a small shed, several shelters / toilet blocks and three huts. There are typically 8,000 visitors in the snow season who mostly cross country ski or snow camp, and school groups are common. Approximately 30,000 people visit outside the snow season, particularly during the December to February period when a significant number of visitors pass through the resort to access attractions such as 'Craig's Hut'. Camping within the resort is common.

2. Water supply systems

The RMB provides drinking water at Mt Stirling (Telephone Box Junction), Mirimbah and Mt Buller.

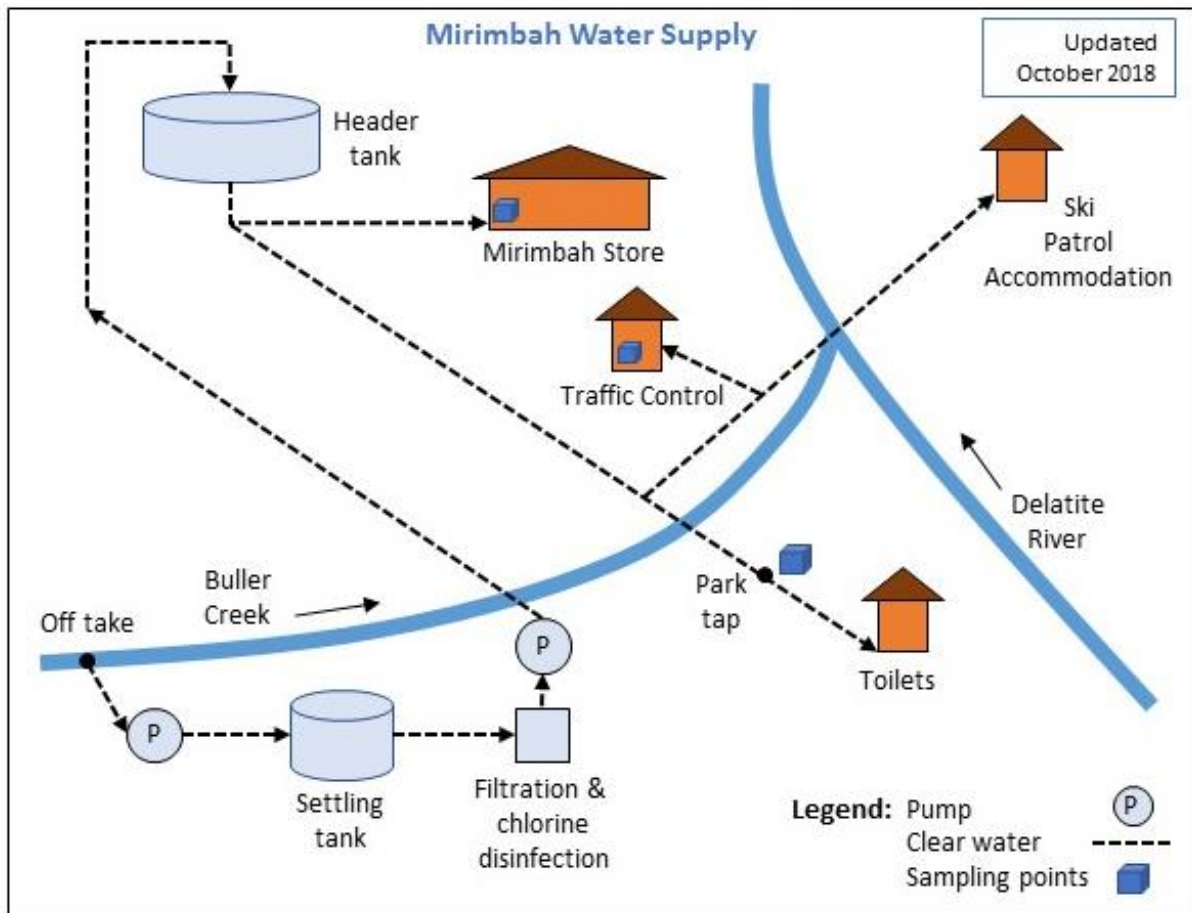
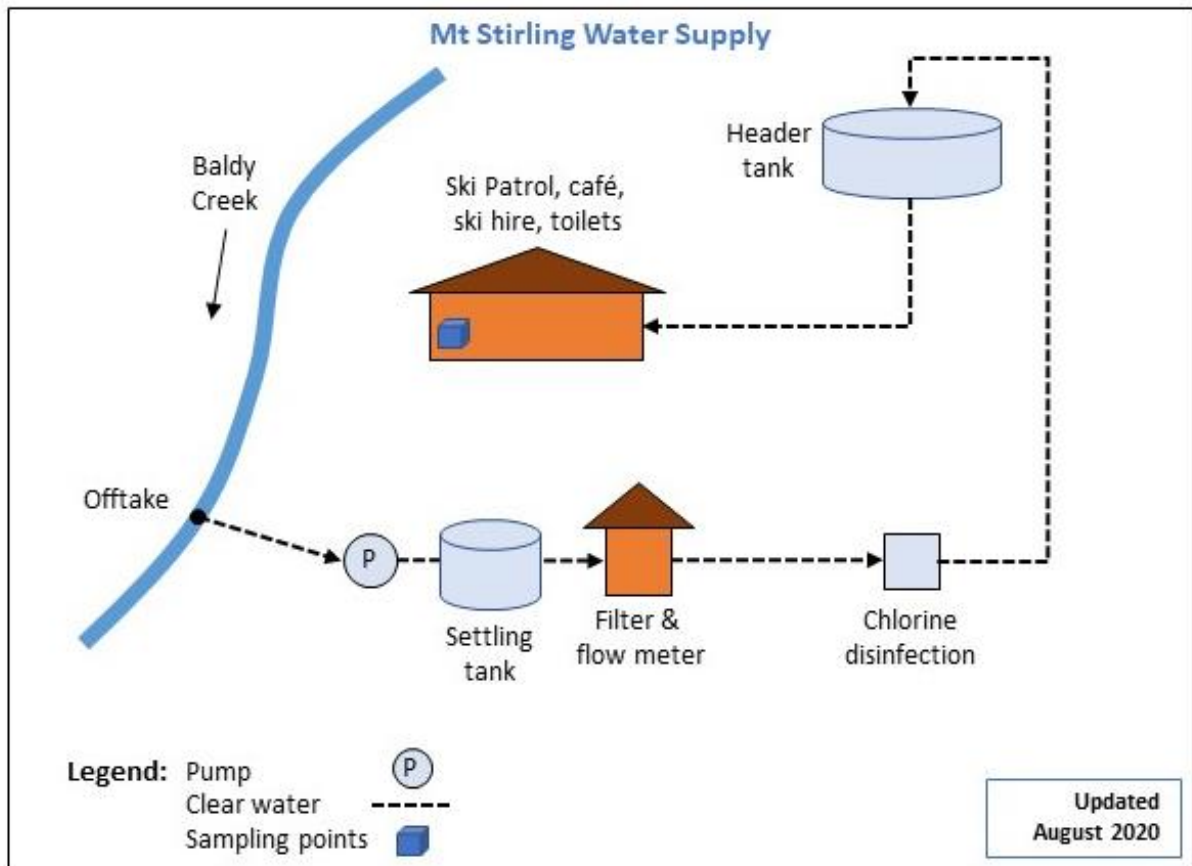
Mt Stirling

The Mt Stirling water supply comes from the perennial and reliable Baldy Creek which runs adjacent to the building at Telephone Box Junction. Water is pumped from the creek to a settling tank, passed through carbon and cartridge filters, dosed with hypochlorite, pumped to a header tank, and then gravity fed through the reticulation system (refer over).

Mirimbah

The Mirimbah water supply comes from the perennial and reliable Buller Creek, approximately 300m upstream from the junction with the Delatite River at an elevation of 620m. Water is collected through a small diversion channel, pumped to a settling tank, passed through cartridge filters, dosed with hypochlorite, and then pumped to an elevated tank approximately 60m higher than the creek. Water is then gravity fed to the Mirimbah Store, resort entry building, public toilets, and to the ski patrol accommodation on the far side of the Delatite River (refer over).

* One visitor staying for two days equals two visitor days.



Mt Buller

Mt Buller's main source of drinking water is the Boggy Creek catchment, which is above 1,250m and mainly covered in snow during the snow season. At these times the water is either snowmelt or groundwater. During summer the majority of water is groundwater. The topography of the catchment is steep and vegetated. The catchment lies in montane, sub alpine and alpine areas, and there are few weeds or other exotic flora. Fauna includes deer, wombat, wallabies and varied bird species. There is a low risk of contamination to this supply source due to its pristine catchment, and limited access by vehicles and humans.

The Headwaters are sourced from a side hill aqueduct across the northeast of Mt Buller. The aqueduct is 60m long, at an elevation of 1,780m, and collects water originating from alpine bogs. While the capacity is less than Boggy Creek, the higher elevation means there is less pumping - so the Headwaters are used in preference to Boggy Creek when there is adequate capacity.

There are two small gullies within the vicinity of the catchment that have small catchment weirs used to extract water.

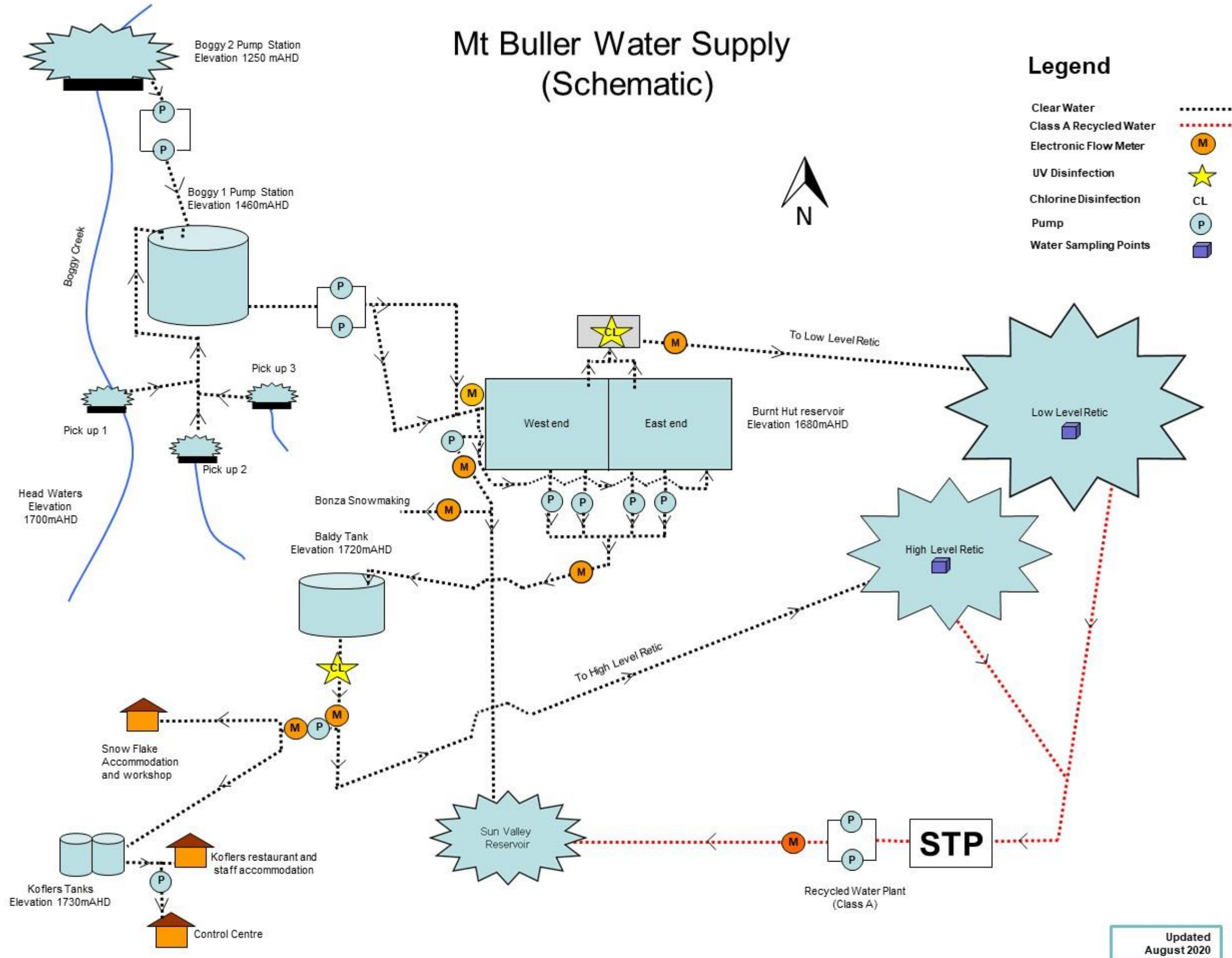
There is a 100m elevation difference across the Village. This results in the reticulation being divided in two and fed from reservoirs at different levels to keep the maximum water pressure within the system below 1,000KPa. Source water is drawn from Boggy Creek and pumped to an open (600 KL) holding tank. Source water from the Catchment Weirs is gravity fed into the same tank. This water is then pumped into the open Burnt Hut Reservoir, along with water from the Headwaters. This reservoir serves the low-level reticulation system with water subjected to UV radiation and dosed with hypochlorite before being reticulated throughout the lower two thirds of the village.

Water is also pumped from Burnt Hut reservoir to an underground concrete tank (1 ML) reservoir known as Baldy Reservoir. This serves the upper-level reticulation system with water subjected to UV radiation and dosed with hypochlorite before being gravity fed throughout the upper third of the Village, to the lift company workshop and public toilet, and to a restaurant in the ski area called Kofler's Hutte. The workshops are served by a rising main, while Kofler's is served through a rising main to two storage tanks (2 x 10 KL) and then gravity fed to the Hutte.

The source water is of good quality and monitored via a water sampling program. Retention in the Burnt Hut Reservoir (4.2 ML) and Baldy tank (1 ML) allows suspended solids to settle before use. Online meters and loggers monitor turbidity prior to treatment. Higher turbidity can occur during wet weather and result in a slight water discolouration. The UV and chlorine systems are serviced annually and monitored constantly via a telemetry-based system. A cyclic maintenance program includes emptying and removing silt from the reservoirs and reticulation system each summer and flushing the reticulation system at least twice a year to remove film build-ups. During 2019/20 the following maintenance and upgrades were completed at Mt Buller:

- Silt removal from Boggy 2 raw water supply weir.
- Rectification of chlorine trim dosing control at high and low level treatment plants.
- New cartridge filtration and chlorine dosing for water treatment was installed at Mt Stirling.

Mt Buller Water Supply (Schematic)



Legend

- Clear Water
- Class A Recycled Water
- Electronic Flow Meter
- UV Disinfection
- Chlorine Disinfection
- Pump
- Water Sampling Points

Updated August 2020

samples were also taken from various sites to test for microbiological levels (E. coli, coliforms and plate count). The reticulation lines were then flushed, with free chlorine and turbidity tests conducted throughout the day.

At 6:30pm, in consultation with DHHS, Mt Buller and Mt Stirling Alpine Resort management Board issued a precautionary Boiled Water Advisory (BWA) due to potentially unsafe drinking water being supplied. This was issued so that the corrective actions and measures can be taken to bring water quality back to required standards. The chlorine dosing set point was further increased from 1.5mg/L to 1.8mg/L at the treatment plant to increase residual within the reticulation as requested by DHHS.

The diversion drain, silt fencing and silt traps were further improved and monitored which successfully prevented further incidents. Flushing of reticulation lines were also continued, along with daily testing for chlorine residual and turbidity at 6 various sites within the low-level reticulation.

- On 13.4.2020 & 14.4.2020:
Following the turnover of reticulation system, water samples were taken to verify that any off-specification water had been removed from the low-level supply system. This included tests for E.coli, coliforms, plate counts, chlorine, turbidity and pH.
- On 22.4.2020:
Test results from ALS indicated all microbiological and chlorine measures remained within the required range throughout the incident event, confirming that NTU measures were the only ones affected, and that these have returned to normal following the rectification actions above. A detailed water quality report and test results were provided to DHHS, and the BWA was subsequently lifted on 24.4.2020.

Following this incident, the inspection of diversion drains of reservoirs have been incorporated into operations routine, especially prior to significant rainfall events to prevent incident reoccurring. It had also been emphasized within the water operations team to assess construction worksites to ensure appropriate stormwater drainage is in place.

Further investigations into failed SCADA alarms indicated radio communications link had failed due to power flicker or interference. The short-term rectification was to perform daily checks on the RTU, and if required, reset RTU to clear fault within the logic and enable alarms to be sent via SCADA to operations team mobile phones. As of 23.6.2020, long-term rectification was completed, which consisted of increased memory capacity within the alarm register of the RTU unit, preventing “backlog” of alarms due to depleted memory space. A status monitoring of alarm register was also made available on the SCADA system, indicating the SMS messenger’s status (operating, enabled, no fault) as well as keeping 24-hour record of alarm messages.

5. Drinking water quality standards

Drinking water quality is monitored against regulatory standards, including undertaking weekly samples for *Escherichia Coli* (*E. Coli*) and turbidity. Monthly samples are collected and tested for disinfection by-products. Results are compared with the quality standards for each parameter in Schedule 2 of the Regulations and health guideline values stated in the Australian Drinking Water Guidelines.

Escherichia Coli

Escherichia Coli	Mirimbah	Mt Buller		Mt Stirling
		Low Level	High Level	
<i>Quality standard (E.Coli per 100ml of drinking water excepting any false positive samples) – Safe Drinking Water Regulations 2015, Schedule 2</i>	0	0	0	0
Sampling frequency	Weekly	Weekly	Weekly	Weekly
No. of samples	53	53	53	53
Maximum detected (org/100ml)	0	0	0	0
No. of samples where standard not met (s.18) for 2019/20 reporting period	0	0	0	0
Maximum values: 2017/18	100%	100%	100%	100%
2018/19	100%	100%	100%	100%
2019/20	100%	100%	100%	100%

E coli results over the last three years have been very good.

The water catchments are of very high quality, located at the top of the regional catchment, at high altitude and vegetated with relatively intact indigenous flora. The high quality of source water and dual disinfection process results in consistently high quality drinking water.

Trihalomethanes

Trihalomethanes	Mirimbah	Mt Buller		Mt Stirling
		Low Level	High Level	
<i>Quality standard (mg/L) - Safe Drinking Water Regulations 2015, Schedule 2</i>	0.25	0.25	0.25	0.25
Sampling frequency	Monthly	Monthly	Monthly	Monthly
No. of samples	12	12	12	12
Maximum (mg/L)	0.03	0.11	0.09	0.08
Average (mg/L)	0.02	0.06	0.06	0.06
No. of samples where standard not met (s.18) for 2019/20 reporting period	0	0	0	0
Maximum values: 2017/18	0.06	0.10	0.09	0.13
2018/19	0.07	0.12	0.08	0.18
2019/20	0.03	0.11	0.09	0.08

Trihalomethane results have met quality standards for the last 3 reporting periods.

Turbidity

Turbidity	Mirimbah	Mt Buller		Mt Stirling
		Low Level	High Level	
<i>Quality standard (95th percentile of results for samples over 12 months) – Safe Drinking Water Regulations 2015, Schedule 2</i>	<5.0 NTU	<5.0 NTU	<5.0 NTU	<5.0 NTU
Sampling frequency	Weekly	Weekly	Weekly	Weekly
No. of samples	53	53	53	53
Maximum turbidity in a sample (NTU)	0.8	2.0	1.3	0.8
Maximum 95 th percentile of turbidity in 12 months	0.6	1.3	0.7	0.3
No. 95 th percentile of results above standard (s.18) for 2019/20 reporting period	0	0	0	0
Maximum values: 2017/18	0.4	1.1	0.9	11
2018/19	0.6	1.9	0.5	2.7
2019/20	0.8	2.0	1.3	0.8

All sampling localities met the turbidity standard for the last three reporting periods. It is noted that the 95th percentile turbidity levels were still met during the last 12 months, since the NTU incident as described in Section 4 above.

The locations of the water sources lead to very low sedimentation and movement of material into the catchment. Historic monitoring of source water in the Boggy Creek catchment has shown virtually no background microbiological life during the snow season, presumably because the freeze thaw cycle provides protection from a build-up of microbial life. Subzero ambient temperatures also inhibit the growth of microbiological life within the water. Background microbial levels do increase during summer, particularly during extended dry periods, however if the turbidity results are elevated the lines are flushed and the tank level dropped to ensure that they remain within the water quality limits. If water is not required during the summer period, then pumps are turned off. The pumps are also turned off and tanks filled proactively prior to a high wet weather event to prevent turbid water being introduced into the water supply system.

6. Other water quality standards

Algae

An automatic dosing system at Burnt Hut Reservoir applies low concentrations of chlorine when the pumps are running, to inhibit and reduce algal growth during summer. This was installed in 2015 in response to algal growth and continues to be effective. Visual checks continue to be completed and recorded twice each week.

Ozone Based disinfection by-product chemicals

Ozone disinfection is not used and therefore the associated by-products are not monitored.

Chlorine Based disinfection by-product chemicals

These are monitored because our treatment processes use chlorine for disinfection.

Chlorine Based disinfection	Mirimbah	Mt Buller		Mt Stirling
		Low Level	High Level	
Chloroacetic acid				
<i>ADWG Quality standard (mg/L) – 0.15</i>	0.15	0.15	0.15	0.15
Sampling frequency	Monthly	Monthly	Monthly	Monthly
No. of samples	12	12	12	12
Maximum (mg/L)	<0.005	<0.005	<0.005	<0.005
Average (mg/L)	<0.005	<0.005	<0.005	<0.005
No. of samples where standard not met (s.18) for 2019/20 reporting period	0	0	0	0
Maximum values: 2017/18	<0.005	<0.005	<0.005	<0.005
2018/19	<0.005	<0.005	<0.005	<0.005
2019/20	<0.005	<0.005	<0.005	<0.005
Dichloroacetic acid				
<i>ADWG Quality standard (mg/L) – 0.1</i>	0.1	0.1	0.1	0.1
Sampling frequency	Monthly	Monthly	Monthly	Monthly
No. of samples	12	12	12	12
Maximum (mg/L)	0.0	0.0	0.0	0.1
Average (mg/L)	0.0	0.0	0.0	0.0
No. of samples where standard not met (s.18) for 2019/20 reporting period	0	0	0	0
Maximum values: 2017/18	0.0	0.1	0.0	0.1
2018/19	0.0	0.1	0.0	0.1
2019/20	0.0	0.0	0.0	0.1
Trichloroacetic acid				
<i>ADWG Quality standard (mg/L) – 0.1</i>	0.1	0.1	0.1	0.1
Sampling frequency	Monthly	Monthly	Monthly	Monthly
No. of samples	12	12	12	12
Maximum (mg/L)	0.0	0.1	0.0	0.1

Average (mg/L)	0.0	0.0	0.0	0.1
No. of samples where standard not met (s.18) for 2019/20 reporting period	0	0	0	0
Maximum values: 2017/18	0.0	0.1	0.0	0.13
2018/19	0.0	0.0	0.0	0.11
2019/20	0.0	0.1	0.0	0.1

Drinking water quality standard not met and actions taken

There were no instances whereby the water standards were not met.

7. Aesthetic Characteristics

pH Results	Mirimbah	Mt Buller		Mt Stirling
		Low Level	High Level	
Sampling frequency	Weekly	Weekly	Weekly	Weekly
No. of samples	64	63	60	53
Average pH	7.50	7.99	8.06	7.32
Minimum pH	6.37	6.40	7.10	6.70
Maximum pH	8.48	9.69	9.01	7.90

No taste or odour issues were identified or reported during the reporting period. Most pH results were within our target range of 6.5-8.5. Lower pH values can be attributed to the low alkalinity in the raw water and the higher water usage during peak snow season. The higher pH values can be attributed to the affect that Ductile Iron Cement Lined pipes and our cement lined storage has on pH during our low usage periods. If the pH moves out of ADWG for aesthetic value specifications, operators may flush the system if required until it returns to operational target specifications. While the minimum sampling frequency is weekly, the number of samples vary across the sites due to accessibility and more frequent treatment plant check over winter period as required.

8. Water Quality Complaints 2019/20

Complaints	Mirimbah	Mt Buller		Mt Stirling
		Low Level	High Level	
Alleged illness	0	0	0	0
Dirty water	0	0	0	0
Taste or odour	0	0	0	0
White water	0	0	0	0
Other	0	0	0	0
Total	0	0	0	0

Complaints	2017/18	2018/19	2019/20
Alleged illness	0	0	0
Dirty water	0	0	0
Taste or odour	0	0	0
White water	0	0	0
Other	0	0	0

There were no complaints in this reporting period, including the period of BWA.

9. Risk Management Plan Audit Results

The Department of Health & Human Services required the RMB to audit its Safe Drinking Water Risk Management Plan, which was completed in May 2020. The audit confirmed compliance with obligations under Section 7(1) of the Safe Drinking Water Act 2003, as has been the case for the previous 7 audits. The audit outcomes were compliant, and noted the following opportunities for improvement:

Opportunities for Improvement	Actions
1. While it is encouraging to note that there is an ongoing training program, suggest considering training of operations team members to provide contingency to the water team.	One member of the Operations team has been trained and working with the Water Team during 2020.
2. Suggest as a high priority to further develop and integrate your SCADA system – further suggestions include a digital radio upgrade to ensure the signals are strong enough.	Signal reliability is a key element in the current project to improve the SCADA system. Digital radio upgrade has been included as part of RMB SCADA strategy, with installation to be complete in 2021
3. It is encouraging to note that numbers of alarms have been further developed, including turbidity, water level, and water meter alarms. Suggest also integrating these alarms with your upgraded Standard Operating Procedures (SOP), for example, SDW10 – 'extraction of raw water from Boggy Creek, Baldy Ck, and Buller Ck – Turbidity limits CCP and training.'	These additional alarms will be added to the SOP's during the next scheduled review / update in Feb 2020 or as operations procedures changes.
4. Regarding your UV systems overhaul, suggest considering a controller that would better match UV intensity against water turbidity and also alarm this to your SCADA system.	This will be addressed when the UV system is overhauled as required.
5. It is also very encouraging to note that chlorine-paced dosing is under review for all sites - this will allow for more accurate control of chlorine dosing. For example, when water use is minimal during the summer period – this will also help to keep to a minimum the formation of any disinfection by-products. a) Suggest for Mt. Stirling to also review additional options; for example, more advanced chlorination. b) Suggest also considering further upgrades to SCADA at Mirimbah. It was encouraging to note that the chlorine-pace dosing upgrade has been implemented at Mirimbah.	As part of the RTU replacement for the two Mt Buller treatment plants, chlorine flow paced dosing will be incorporated, to be completed by March 2021 Mt Stirling's recent filtration and chlorine installation has now been completed and operational. The Mirimbah SCADA and control upgrade was complete as of August 2020.
6. A suggestion for your Mt. Buller site is to upgrade your Burnt Hut Reservoir. Possible options could include upgrading into new sealed tanks, underground tanks, and/or large sealed bags. Also, consider both raw water and post disinfection tanks at this site. a) Suggest prompt implementation – need to consider that the new large open reservoir may not necessarily be suitable as replacement raw water storage for potable use but would supply the snowmaking water requirement. b) An upgrade to your Burnt Hut Reservoir tank(s) would help to reduce the estimated water loss of one litre per second.	The intention is to decommission Burnt Hut Reservoir once supply via the new Boggy Creek Reservoir has proven satisfactory in 2021/2022.
7. Suggest also consider security camera upgrade integrated with installing additional security signs.	A security and signage review is scheduled to be complete in 2021.

10. Undertakings

The RMB has no undertakings in place with the Department of Health & Human Services.

11. Further Information

Section 23 of the *Safe Drinking Water Act 2003* requires that the RMB makes available to the public the results of any water quality monitoring program that is conducted on any drinking water that it supplies. This information is available by contacting the Board as per the details provided on page 1.