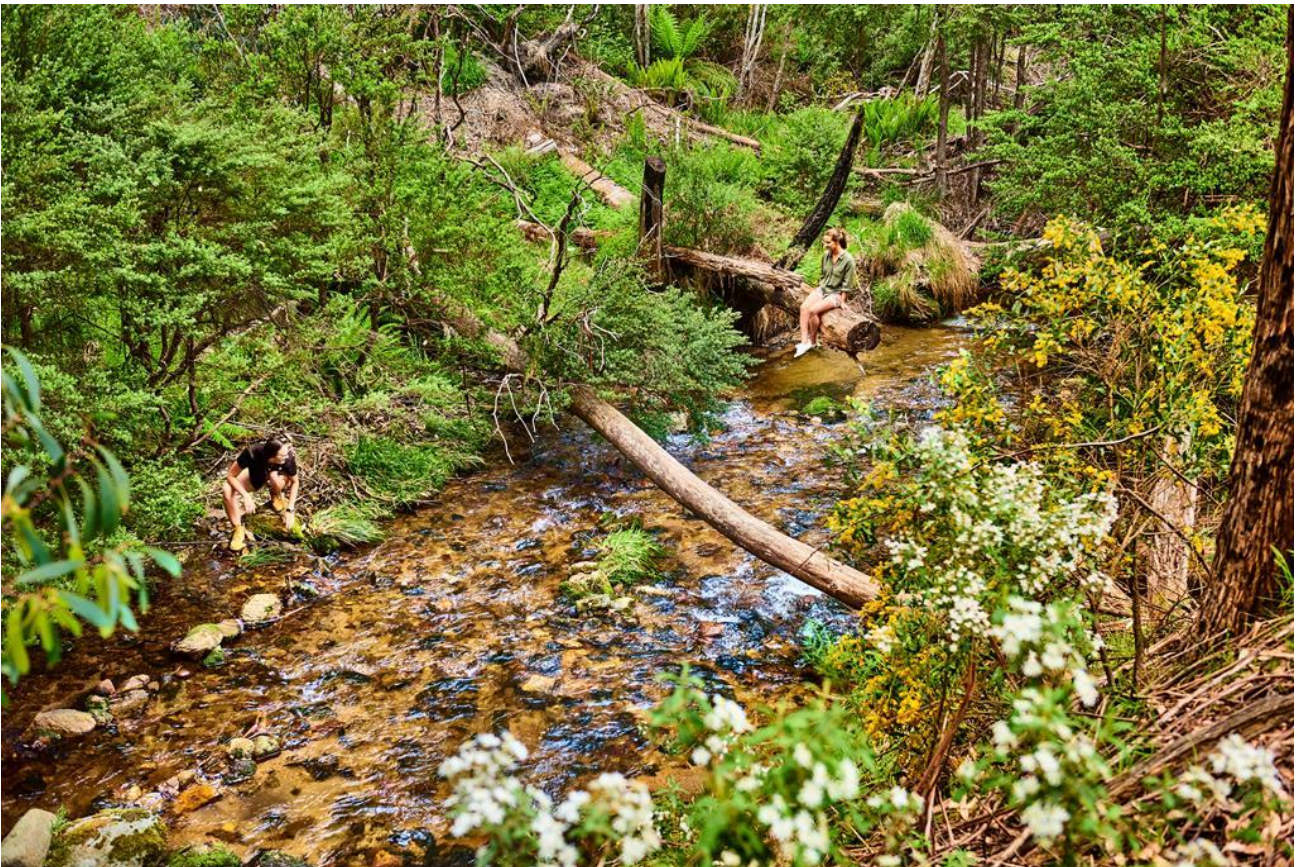




## ANNUAL REPORT 2018-19

### DRINKING WATER SUPPLY

### MT BULLER & MT STIRLING ALPINE RESORTS



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Photo credit © Andrew Railton – Mt Buller

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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 26 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 2018-2019 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](http://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 maybe 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 a licence 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) for the Mt Buller Alpine Village 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

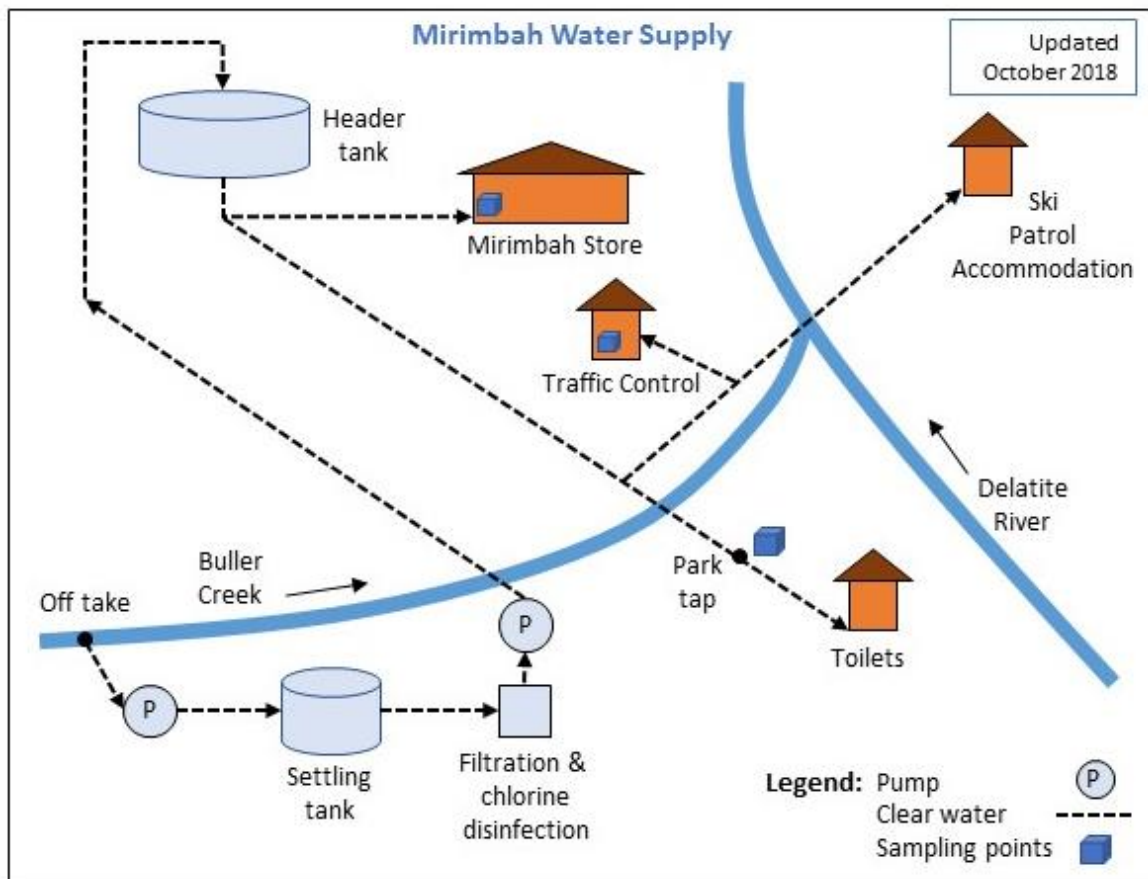
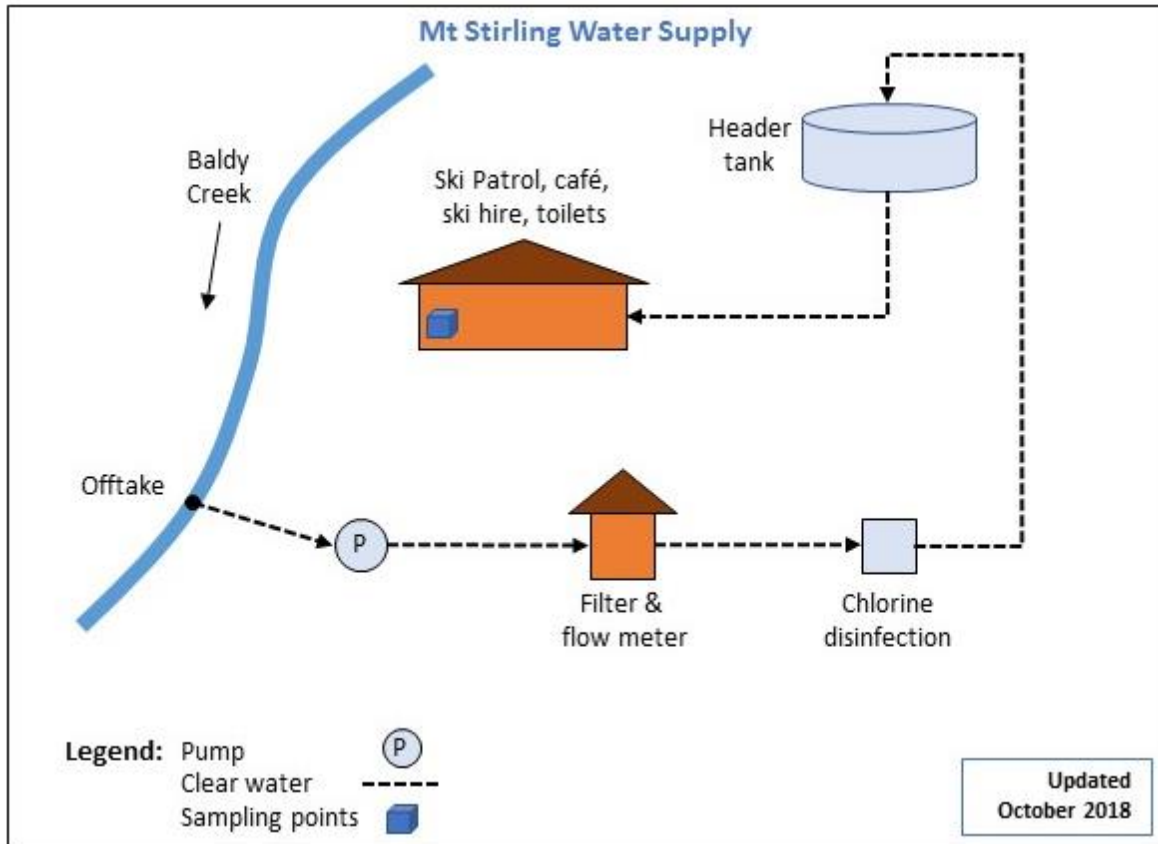
The Mt Stirling water supply comes from the perennial and reliable Baldy Creek which runs adjacent to the building at Telephone Box Junction. Water is pumped from the creek, passed through cartridge filters, dosed with hypochlorite, pumped to a header tank, and then gravity fed through the reticulation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



\* A visitor day is the number of days a visitor stays within the resort. One visitor staying two days is 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 a number of small gullies within the vicinity of the catchment that have small catchment weirs used to extract water.

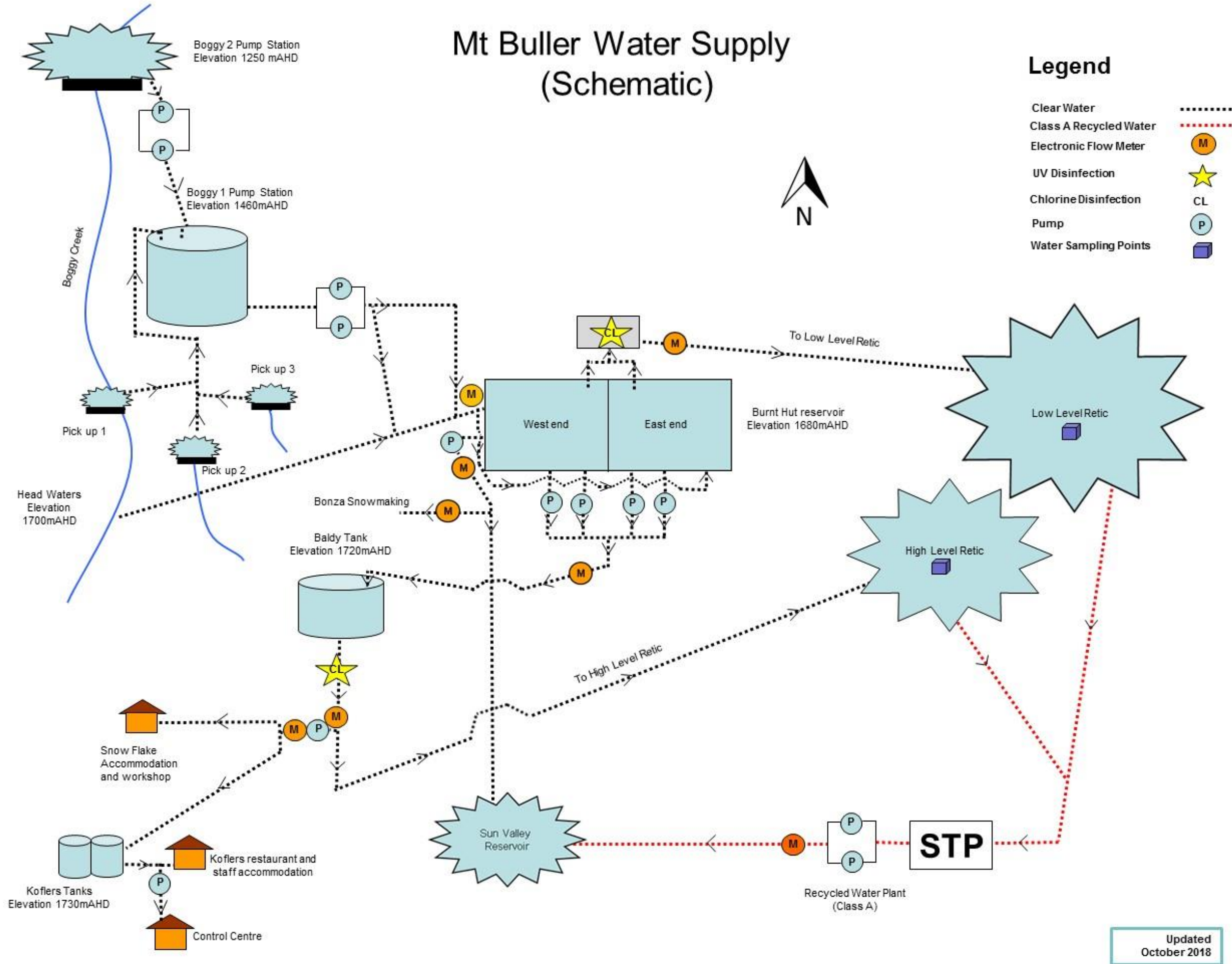
There is a 100m elevation difference across the Village. This results in the reticulation being divided in two and fed from reservoirs at different levels to keep the maximum water pressure within the system below 1,000KPa. Source water is drawn from Boggy Creek and pumped to an open holding tank. Source 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 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 work shop 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 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 and Baldy tank 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 2018/19 the following maintenance and upgrades were completed at Mt Buller:

- Repair to broken water main which was struck by lightning
- Significant maintenance to UV on High and Low Level Treatment Plants
- Two fire hydrant repairs and replacements
- Vacuuming of syphoning silts and organic matter from Boggy Creek and Baldy reservoirs.

# Mt Buller Water Supply (Schematic)



Updated  
October 2018

### 3. Drinking Water Treatment Process

	Treatment process													Added substances							
	Clarification			Filtration			Disinfection				Other			Lime/Soda ash/Caustic soda/Carbon dioxide/Sulphuric acid	Aluminium-based coagulants	Iron-based coagulants	Polymers	Chlorine	Ammonia	Flouride	
Coagulation and flocculation	Sedimentation or clarification	Dissolved air flotation	Granular Media Filter	Membrane	Cartridge Filter	Chlorine gas	Sodium hypochlorite	Chlorine dioxide	Ultraviolet (UV)	Ozone	Activated carbon (PAC/GAC)	Ion exchange	Reverse osmosis								Sludge-handling (mechanical with chemical addition)
Mirimbah						✓	✓												✓		
Mount Buller Low Level System							✓		✓											✓	
Mount Buller High Level System							✓		✓											✓	
Mount Stirling						✓	✓													✓	

There were no issues in relation to the processes used for disinfection.

### 4. Emergency Incident & Event Management

There were no Section 22 reports during the period of 1.7.2018 to 30.6.2019.

### 5. Drinking water quality standards

Drinking water quality is monitored to ensure it meets regulatory standards, including testing weekly samples for *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	
Quality standard ( <i>E.Coli</i> per 100ml of drinking water excepting any false positive samples) – Safe Drinking Water Regulations 2015, Schedule 2	0	0	0	0
Sampling frequency	Weekly	Weekly	Weekly	Weekly
No. of samples	51*	51*	51*	51*
Maximum detected (org/100ml)	0	0	0	0
No. of samples where standard not met (s.18) for 2018/19 reporting period	0	0	0	0
Maximum values: 2016/17	98.1%	100%	100%	100%
2017/18	100%	100%	100%	100%
2018/19	100%	100%	100%	100%

\* Due to human error one set of samples was missed on 23.4.2019 due to the freight company not collecting the samples from the workshop and delivering to the testing lab in Melbourne.

*E coli* results over the last three years have been very good, other than one detection at Mirimbah in 2016/17. 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.

During the sampling period 23.4.2019 although samples were not tested by the lab, all other treatment indicators; including turbidity, UV disinfection and chlorine residuals were within our water quality targets.

#### 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)	0.07	0.12	0.08	0.18
Average (mg/L)	0.04	0.06	0.05	0.08
No. of samples where standard not met (s.18) for 2018/19 reporting period	0	0	0	0
Maximum values: 2016/17	0.06	0.13	0.12	0.18
2017/18	0.06	0.10	0.09	0.13
2018/19	0.07	0.12	0.08	0.18

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 (95<sup>th</sup> 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	51*	51*	51*	51*
Maximum turbidity in a sample (NTU)	0.6	1.9	0.5	2.7
Maximum 95 <sup>th</sup> percentile of turbidity in 12 months	0.4	0.9	0.6	1.6
No. 95 <sup>th</sup> percentile of results above standard (s.18) for 2018/19 reporting period	0	0	0	0
Maximum values: 2016/17	1.8	2.5	0.5	1.6
2017/18	0.4	1.1	0.9	11
2018/19	0.6	1.9	0.5	2.7

\* Due to human error one set of samples was missed on 23.4.2019 due to the freight company not collecting the samples from the workshop and delivering to the testing lab in Melbourne.

All sampling localities met the turbidity standard for the last three reporting periods. 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 standards. limits. If water is not required during the summer period the pumps are turned off. The pumps are turned off if a high wet weather event is forecast and tanks are also filled proactively prior to the wet weather event to prevent dirty 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	
<b>Chloroacetic acid</b>				
<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 2018/19 reporting period	0	0	0	0
Maximum values: 2016/17	<0.005	<0.005	<0.005	<0.005
2017/18	<0.005	<0.005	<0.005	<0.005
2018/19	<0.005	<0.005	<0.005	<0.005
<b>Dichloroacetic acid</b>				
<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	0.0
No. of samples where standard not met (s.18) for 2018/19 reporting period	0	0	0	0
Maximum values: 2016/17	0.1	0.1	0.0	0.2
2017/18	0.0	0.1	0.0	0.1
2018/19	0.0	0.1	0.0	0.1
<b>Trichloroacetic acid</b>				
<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	0.11
Average (mg/L)	0.0	0.0	0.0	0.0
No. of samples where standard not met (s.18) for 2018/19 reporting period	0	0	0	1
Maximum values: 2016/17	0.1	0.1	0.0	0.2
2017/18	0.0	0.1	0.0	0.13
2018/19	0.0	0.0	0.0	0.11

### Drinking water quality standard not met and actions taken

The one instance at Mt Stirling where water standards for disinfection by-products (Trichloroacetic acid) were not met was reported to DHHS under Section 18 of the *Act*. As in previous years, wet weather increased turbidity and natural organic material in the source water for short periods of

time. When this water is disinfected with chlorine and sits unused in a storage tank, the chlorine reacts with the organic material and forms by-products. These by-products continued to occur when water had been within the tank for longer than usual. This combination of low water usage and wet weather continued to be the likely cause of elevated disinfection by-products at Mt Stirling. On each occasion the tank and system were flushed and replenished with freshly treated water. The dosing and filter cartridge points have been reversed to ensure filtration occurs pre-chlorination to reduce the risk of disinfection by-products forming. A replacement pump has been installed to improve reliability. Sporadic non-compliance with disinfection by-products has occurred for several years.

One instance of chlorine concentration exceeding the water standards at Mount Buller was reported to DHHS under Section 18 of the Act in February 2019. This report was made in error and no customers were receiving water at this time due to the resort being closed. This was discussed with the department at that time.

The installation of new filtration equipment was completed in May 2019, and the installation of a new chlorination system is planned in September 2019 as part of the complete upgrade of the treatment facility.

## 7. Aesthetic Characteristics

pH Results	Mirimbah	Mt Buller		Mt Stirling
		Low Level	High Level	
Sampling frequency	Weekly	Weekly	Weekly	Weekly
No. of samples	52	52	52	52
Average pH	7.28	8.42	8.97	7.21
Minimum pH	6.04	6.30	7.47	6.54
Maximum pH	8.06	10.50	9.89	7.92

No taste or odour issues were identified or reported during the reporting period. The 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 operational specifications, operators flush the system until it returns to operational target specifications.

## 8. Water Quality Complaints 2018/19

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	2016/17	2017/18	2018/19
Alleged illness	0	0	0
Dirty water	0	0	0
Taste or odour	0	0	0
White water	0	0	0
Other	1	0	0

The one complaint in 2016/17 related to a lack of pressure due to reticulation interruption. There were no complaints in this reporting period.

## **9. Risk Management Plan Audit Results**

Mt Buller & Mt Stirling RMB Safe Drinking Water Risk Management Plan was not required to be audited during this reporting period. There were no further audit OFI's to complete following the audit conducted in May 2018.

## **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 for inspection by 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.