ALPINE RESORTS VICTORIA

DRINKING WATER QUALITY ANNUAL REPORT 2022-2023

VICTORIA State Government

Foreword

Alpine Resorts Victoria is a statutory authority bringing a sector wide focus and strategic leadership to the management of Victoria's alpine resorts. Each resort provides a unique experience of Victoria's beautiful and remote alpine landscapes. Together they play an important role in supporting regional communities by attracting over one million visitors a year and sustaining ten thousand jobs.

Prior to ARV's formation in October 2022, the Resort Management Boards performed the function of designated water suppliers under the *Safe Drinking Water Act 2003*. This responsibility has now been centralised with management of drinking water supply part of the broader ARV portfolio.

At the core of its purpose, ARV provides essential services to business operators, visitors and the local alpine communities, while also developing, promoting, and using each resort in a sustainable manner, recognising the ecological significance of the Victorian alpine areas.

ARV continues to focus on delivering essential services for our people and community, including the provision of high-quality safe drinking water.

Water supply at our locations is a combination of high-altitude aquifers extracted via groundwater bores or via surface water reservoirs. All our mountain catchments provide incredibly pure alpine water, driven by snow melt and largely untouched by human activity.

Once again throughout the 2022-23 period the quality of water provided by all resorts to its constituents was generally excellent. However, we also acknowledge that there is still work to do to evolve the operations of the previous Resort Management Boards and improve our risk management processes. We remain committed to providing the highest possible risk management standards to ensure the ongoing safety of our water supply and ultimately the health of our consumers.

We thank the Victorian State Government and ARV Board members for their support and congratulate our resort stakeholders on their resolve and resilience over the last several years. To our committed and agile staff, we thank them for their extraordinary contribution to our organisation and look forward to providing an exemplary water supply service over the coming period.

Amber Gardner
Chief Executive Officer, Alpine Resorts Victoria

Contents

1. Executive Summary

1.1 Legislative Background and Purpose

Alpine Resorts Victoria (ARV) was constituted on 1st October 2022 and included the replacement of individual alpine resort boards with a singular central board (Board) and executive management structure as defined by the *Alpine Resorts (Management) Act 1997.* Under the *Safe Drinking Water Act 2003* (Act) the Board is also the designated water supplier, essentially moving this legislative responsibility away from each individual resort.

ARV's obligations under the Act include:

- A requirement to prepare, implement and review plans to manage risks in relation to drinking water;
- A requirement to have the risk management plan audited by approved auditors;
- To ensure that the drinking water meets quality standards specified by the regulations;
- To disclose to the public information concerning the quality of drinking water; and
- To report known or suspected contamination of drinking water to the Secretary of the DH.

Section 26 of the Act requires water suppliers and water storage managers to provide to the Secretary of the Department of Health (DH) an annual report each financial year. ARV is now the water supplier for all previously established alpine resorts:

- Falls Creek Alpine Resort (FCAR)
- Mt Hotham Alpine Resort (MHAR)
- Mt Buller & Mt Stirling Alpine Resort (MBMSAR)
- Mt Baw Baw Alpine Resort (MBBAR)
- Lake Mountain Alpine Resort (LMAR)

Information to be included in the annual report is specified by regulation 16 of the Safe Drinking Water Regulations 2015 (Regulations)

This report outlines drinking water quality achieved for the 2022-23 financial year across all alpine resorts and has been prepared to provide ARV customers with information relating to the quality of water supplied and to comply with the annual reporting requirements under Section 26 of the Act. The report covers the nature of the supply and information relating to the quality of drinking water.

This report has separated into each resort based on the previous annual report structure. Future reporting will consolidate this information across all resort sites in accordance with the Water Quality Annual Report Guidance provided by the DH.

1.2 Water Quality Performance – ARV Portfolio

Table 1.1 – Schedule 2 Quality Parameter Exceedances

Parameter	FCAR	MHAR	MBMSAR	MBBAR	LMAR
E. Coli	1*	0	3**	0	N/A***
Turbidity	0	0	0	0	N/A***
THMs	0	0	0	0	N/A***

* false positive
** one case false positive
*** not applicable for regulated water supply

Table 1.2 – ADWG Aesthetic Guideline Exceedances

FCAR	MHAR	MBMSAR	MBBAR	LMAR
0	0	**	**	N/A*

* not applicable for regulated water supply
** refer to report details

Table 1.3 – s18 or s22 Notifications to DH

Parameter	FCAR	MHAR	MBMSAR	MBBAR	LMAR
s18	0	0	0	0	0
s22	1*	0	3*	0	0

* response to items in Table 1

Table 1.4 – Water Quality Complaints

FCAR	MHAR	MBMSAR	MBBAR	LMAR
0	0	0	0	0

Table 1.5 – 2023 Risk Management Plan Audit Findings

Parameter	FCAR	MHAR	MBMSAR	MBBAR	LMAR
Critical Non Compliances	0	0	0	0	0
Major Non Compliances	0	0	0	5	0
Minor Non Compliances	0	4	0	4	1
OFIs	8	12	9	18	7

2. Falls Creek Alpine Resort

2.1 Introduction

FCAR is responsible for the development, promotion and management of the Falls Creek Alpine Resort which is located 120 kilometres south of the Albury/Wodonga area is situated at an altitude of 1210-1830 metres and is surrounded by the Alpine National Park.

The entire resort area of 1495 hectares is Crown land, which is deemed to be permanently reserved as an alpine resort under the *Crown Land (Reserves) Act* 1978. The Resort area is not part of any municipal district for the purposes of the *Local Government Act 1970* and the Board acts on behalf of the Crown under the direction and guidance of the Minister for Environment.

Alpine Resorts Victoria (ARV) is established by the *Alpine Resorts (Management) Act* 1997 and *Alpine Resorts (Management) Regulations* 2020 which sets out the objectives for the management of Victoria's alpine resorts. ARV is a statutory authority the reports to the Minister for Environment.

The resort is set aside for alpine recreation and tourism. The development, promotion, management and use of the resort is to be undertaken in a manner which is compatible with the alpine environment having regard to economic, environmental, and cultural considerations. The village area supports administrative, retail, and commercial business as well as a large variety of accommodation.

FCAR provides a range of services to the community and resort visitors determined by clearly defined functions under the Act. These include the provision of a range of utility services including the supply of drinking water.

Falls Creek Resort Management is committed to producing safe and aesthetically pleasing drinking water.

The village population, and consequent demand for water, is highly seasonal. The summer permanent population is around 200, with winter daily visitation exceeding 5000 people during peak periods.

2.2 Falls Creek Overview

FCAR is continually striving to provide quality drinking water services for our customers and the most effective means of doing so is through a preventative risk management approach that encompasses all steps in water production from the catchment to the consumer.

FCAR's drinking water risk management plan (RMP) discusses the measures adopted by the resort to comply with the Act and the Regulations. There is a clear statement of executive commitment contained in Board Policy 1.30 (Safe Drinking Water) which acknowledges the organisation's obligations under the Act. FCAR has approved and committed to the RMP. As a further demonstration of this commitment, the Corporate Plan recognises the Board's responsibility to implement an effective system for drinking water quality management. The FCAR 2022-23 Annual Report acknowledges responsibilities under the Act and notes a range of FCAR activities in complying with the requirements of the Act.

In recent years, FCAR has undertaken several projects involving the commitment of substantial capital investment to improve the reliability and robustness of water quality management in the resort. The development of these activities indicates the practical commitment of FCAR to continue to work to achieve safe drinking water within the resort.

2.3 Water Supply System

Overview

The water supply system is comprised of the following elements:

- Three separate ground water sources
  - 2 x vertical Production Bores
  - 1 x Horizontal Bore
- An Accumulation Tank for transfer through calcite filtration system
- Calcite Filter prior to the Header Tank to mitigate pH excursions
- 2 x 1.5 ML water storage tanks located above the village
- 2 x Wedeco Spektron 250e UV Disinfection units
- 4km (approx.) Ductile Iron Concrete Lined (DICL) reticulation pipework.
  The surface water system is used primarily to supplement the ground water system during the peak winter demand. It is not used between September and May, the main summer period.
  The surface water supply system is comprised of;
- An intake within the Rocky Valley Dam;
- A pumping station, that transferers water from the Dam to two Settling Tanks;
- Two Settling Tanks, which provided a means to allow any residual suspended solids to be removed
- A pipeline/gravity main to Blue and Brown storage tanks

Classification of Raw Water Sources

The recharge areas for Rocky Valley Dam and the Production Bores and the Horizontal Bore may be characterised as pristine catchments. They are within the boundaries of the Falls Creek Alpine Resort and surrounded by the Alpine National Park. These areas do not include any habitation, grazing, cropping, or other human industrial activities. They are at a higher altitude than the Falls Creek Village, meaning that they are not polluted by any wastewater emanating from the village. While they are accessible to hikers in summer and skiers in winter, there is little evidence of rubbish dumping or vandalism. They contain populations of native and feral fauna, but these animals do not aggregate into significant herds. There are negligible sources of protozoan pathogens in the recharge areas.

The Production Bores and the Horizontal Bore are well sealed to prevent ingress of surface run-off water. However, given the fractured nature of the geology, a pessimistic view is warranted, and the groundwater has been assessed as if it were surface water. Even so, the above factors suggest that the groundwater may be expected to be devoid of any substantial microbial or chemical contamination. This has been borne out by groundwater analyses conducted to date, which show soft water with no microbial contamination and very low concentrations of dissolved solids.

There have been no recorded incidences of algal problems in the Rocky Valley Dam supply. The likely reason for this is that inflows are low in nutrients and the low temperature of the lake water, which generally lies in a range between 0˚C and 16˚C.

Recreational boating under strict conditions is permitted on the lake in summer months. There are designated access areas for boats. Boating near the water supply offtake is not permitted. The huge dilution factor associated with the lake provides substantial mitigation in the event of any fuel spill contamination. The low water temperatures result in very limited participation in swimming. While the lake is openly accessible to the public, the supply infrastructure is inspected regularly and there is no history of vandalism.

Microbial Assessment

Microbiological sampling of raw water from the groundwater sources has been undertaken since 2015. While this is a short time-frame in terms of water quality monitoring, the results to date show no detectable *E. coli* in 100 ml samples.

Long term microbiological sampling data of raw water from Rocky Valley Lake typically show no detectable *E. coli* in 100 ml samples and what detections there are typically show single digit concentrations per 100 ml. The average reading for the last 3 years is one *E. coli* per 100ml sample and the range is from zero to 5.

In summary, the sanitary survey and vulnerability assessment suggests that

- ***The ground water conforms to the treatment needs Category 1 in the WSAA Manual.***
- ***The surface water conforms to the treatment needs Category 2 in the WSAA Manual.***

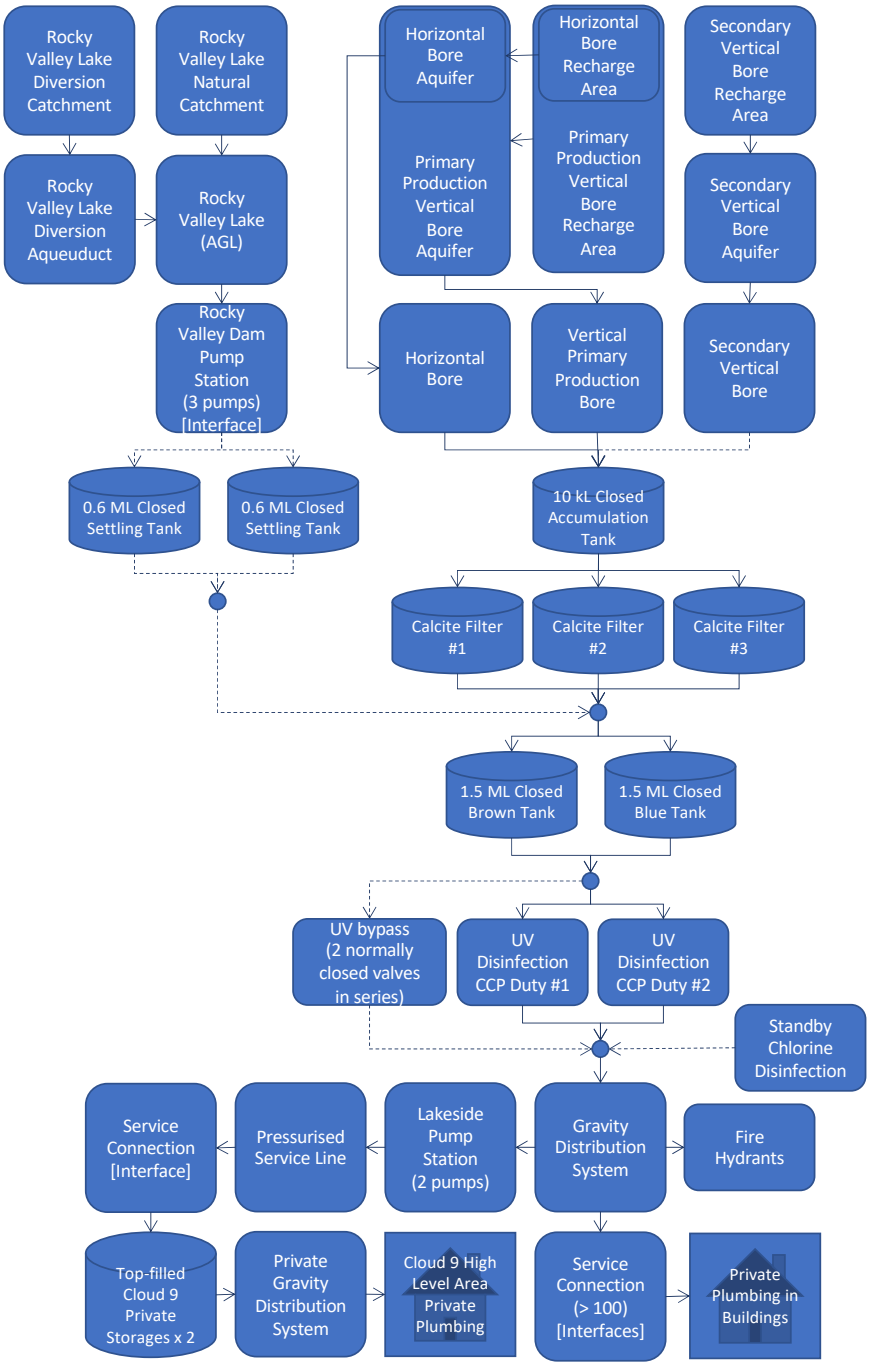


Figure 2.1 Process Flow Diagram of Water Supply System Falls Creek

Groundwater Sources

Geological and hydrogeological studies have been undertaken by FCAR for over a decade as part of the geotechnical risk management program. As part of these investigations, several horizontal bores were installed throughout the village. These bores were identified as a potential water source for the village. Vertical drilling was undertaken in 2014 to further study geological structures identified from geophysical mapping. Based on the results of the vertical drilling, a groundwater Production Bore was installed at a point identified as a high yield location.

Production Bores

Approval for the Production Bores was obtained from the Designated Authority, Goulburn-Murray Water (GMW). Conditional licence for groundwater extraction and the licence for the drilling and construction of the production bores were received as required. It is a condition of the licence that bores must be constructed to prevent aquifer contamination caused by vertical flow outside the bore casing and the bore head must be constructed to ensure that no flood water, surface runoff or potential subsurface contaminated soakage can enter the bore. The initial Production Bore was commissioned in 2016, with second bore being commissioned in 2022. They source groundwater from a depth of 60-70 metres below ground level.

In keeping with the licence requirement, the bores are well sealed against ingress of surface and sub-surface water with a concrete pit and air-tight seal (Gatic). Concrete grout has been installed around the casing to a depth of 16 m. Below this, 2m of bentonite has been installed to seal the bores and support the grout. Below the bentonite, gravel packing has been placed between the borehole and the casing.

SCADA records of water level in both bores demonstrate that there is an expected decrease in response to pumping. While the nature of the fractured geology allows the bores to recharge quite quickly, no sudden rises in water level or sudden falls in turbidity have been observed after rain events confirming no surface water ingress. The groundwater, however, should be assumed to be under the influence of surface water because of the fractured geology. The water from the bore is tested weekly by a NATA accredited laboratory, so any changes in water quality will be identified immediately.

The bores are situated between 50m and 400m from the Storage Tank complex (Brown and Blue). The pipework linking the Production Bore with the Storage Tank complex is entirely underground which substantially reduces the risk of human interference.

Horizontal Bores

A Horizontal Bore is also linked to the Drinking Water Supply. This bore is part of a system of bores that were constructed to facilitate hydrostatic depressurisation of geological features in the vicinity of the Falls Creek village.

As the bore is horizontal, the risk of contamination from surface runoff and subsurface contaminated soakage is reduced. The bore and the associated surface casings are positioned either below ground level or behind a concrete head wall, again reducing risks associated with human interference.

Recharge Areas

The recharge areas for the groundwater aquifer are situated south of the Bore and Storage Tank complex, covering an area of approximately one square kilometre. This area is sited at a higher altitude than the previous Rocky Valley Dam source, is relatively close to, but at a higher altitude than the village, and is located entirely within the boundaries of the Falls Creek Resort (which, itself, is bordered on all sides by the Alpine National Park).

The only water quality hazards in the recharge areas relate to faecal contamination from native and feral fauna. This is considered to be quite a low risk due to the surface slope which could reasonably be expected to quickly wash any faecal material to lower areas, away from the recharge areas.

Groundwater quality

The quality of the groundwater has been closely investigated. The results indicate a high quality, but very soft and unbuffered water source. The composition of water from the Horizontal Bores is very similar to the composition of the Production Bore, indicating similar sources. The Horizontal Bores, however, have slightly lower pH, Suspended Solids and Turbidity.

Potential contaminants investigated in these groundwater sources included heavy metals, organics including pesticides, and radiological parameters. All analytes were found to be lower than Health Guideline Values in Australian Drinking Water Guidelines 2011 (ADWG).

Back up Rocky Valley Dam supply – Surface Water

The catchment area for the Rocky Valley Dam water supply is a well vegetated, high-altitude location which forms part of the Alpine National Park. There is limited recreational access to the catchment areas with skiing activities in winter and hiking and sailing activities in summer.

The current Alpine National Park Management Plan for the Bogong Unit specifically nominates water supply and catchment protection as one of the three primary Park management objectives. Further, as a management objective, the plan stipulates protection of water catchments as the highest priority.

Within the National Park, there are no dwellings or human habitation of any kind, no farming or agricultural activity of any kind and no other industrial or mining activity. To ensure that these protections are maintained, Parks Victoria have a range of compliance and enforcement powers. FCAR also exercises significant controls over land use and visitor activity within the resort area.

When the surface water supply is in use, water from the lake is pumped to a pair of enclosed 0.6 ML Settling Tanks by three pumps (duty/stand-by/back-up, total capacity of 30 L/S). Residence time in the Settling Tanks is in the range 10 - 24 hours, depending on demand. There is no telemetry to the Pumping Station or the Settling Tanks, but these infrastructure elements are inspected daily when the system is operational. Water flows under gravity from the settling tanks to the Brown and Blue Storage Tanks, which are monitored with telemetry and alarmed for a level below 80 % of capacity.

The Rocky Valley Dam is managed and operated by AGL Hydro and is used for water supply to Falls Creek Alpine Resort and for the generation of hydroelectricity. Its capacity of 28,000 ML provides substantial residence time to allow removal of sediment.

Rocky Valley Dam has a history of stratification around mid-summer, usually mid- to late-January and to a lesser extent in mid-winter depending on ice build-up on the surface. During the summer lake stratification events, elevated levels of iron (Fe) and manganese (Mn) may be observed. These contaminants are released by anoxic reactions of vegetative sediment at the bottom of the lake, especially ash-laden sediment inflows after bushfires. They create the appearance of dirty water and absorb UV light. Previous options available to FCAR to manage these contaminants are aeration of the dam or utilising alternate off-takes (from an aqueduct which runs above the village and into the lake, or from the snow making water supply drawn from a floating pontoon at the deepest part of the lake). FCAR now avoid the use of the dam during the summer stratification periods as the bore has sufficient capacity to cope with demand.

Header Storage Tanks (Brown and Blue Tanks)

The water storage consists of two 1.5ML storage tanks. These tanks store 300% of current daily maximum demand and provide a buffer in the event of infrastructure failure.

These tanks have locked roof hatches and access locations near the base. They are externally inspected on a weekly basis and are bi-annually drained to permit a detailed internal inspection (one tank per year, alternating each year).

UV Treatment
Water entering the reticulation from the storage tank is disinfected using UV treatment. The UV disinfection plant installed at Falls Creek is adequate to safely disinfect the raw water under normal circumstances and under higher demand than at present.

Further information regarding the UV treatment system is contained in *Section 2 Drinking Water Treatment Processes*

Reticulation system

Treated water flows from the disinfection plant to consumers through the reticulation system. The reticulation system is comprised of nearly 4 km of pipe, most of which is rubber ringed cement lined ductile iron (DICL) pipe, with some un-plasticised Polyvinyl Chloride (uPVC). Condition assessments have indicated that there is a low risk of corrosion failure over the next thirty years. The network is inspected every five years as a part of the preventative maintenance program. Water jetting is executed if the visual inspection indicates that it is required.

The reticulation system supplies a permanent population of approximately 200 people during Summer with short-term summer event populations reaching up to 3500 people and winter resident populations of up to 5600 people. Water samples are collected from four locations throughout the reticulation system.

2.4 Implications for Risk Management

Groundwater Supply

The Production and Horizontal Bores associated with the groundwater source are well sealed from ingress. This means that the risk of direct inflows of contaminated water into the boreholes is very low. The recharge area for the underground aquifer is relatively close to the village and at a higher altitude than the previous Rocky Valley Dam source. All the pipework between the bore surface casings and the Accumulation Tank are underground to prevent damage and freezing during winter.

While these features may not be expected to impact the likelihood of faecal contamination from native and feral animals, the likelihood of risks attributable to human activities, such as rubbish dumping, spills, defaecation in open areas, and malicious damage are expected to be lower than comparable risks in the more isolated National Park environment of the Rocky Valley Dam catchment. The groundwater source has no hazard which is analogous with “human activities on the storage”.

In summary, there are no major water quality hazards for the, groundwater-based, Falls Creek Water Supply. The hazards to water quality that do exist are relatively low and are either eliminated or reduced to acceptable levels by the treatment processes employed.

Weekly water quality analyses confirm this assessment. They show that no *E. coli* has been detected in the untreated groundwater samples collected in the past 12 months.

Rocky Valley Dam Backup Supply

The Rocky Valley Dam supply is tasked as a back-up supply, had very few significant risks to water quality. It was derived from a near-pristine catchment that was enclosed within the Alpine National Park. The most significant water quality risks to this supply have been identified in past risk assessments as:

- human activities in the catchment (skiing, bushwalking, camping, dumping, fuel spills);
- faecal contamination from native and feral animals in the catchment;
- excessive concentrations of Iron and Manganese during summer lake inversion events; These parameters are monitored six-monthly
- human activities on the storage (boating and fishing);
- fire in the Alpine National Park.

Historically, water quality testing of raw water from the Rocky Valley Dam supply revealed very few *E. coli* detections. This corroborates the above conclusion that there are very few significant risks to water associated with the surface supply from Rocky Valley Dam.

2.5 Implications for Emergency Management

The low risk levels identified in the above description have enabled the development of robust preventive measures and risk mitigation strategies. These will reduce the likelihood of any emergency or incident that may reasonably arise in relation to the supply. Further, since most of the preventive and risk mitigation measures have been incorporated into the design of installed infrastructure, there are few procedures and strategies that need to be considered during an emergency or incident.

The primary concern for the water supply emergency relates to depletion of storage due to leaks and/or large consumption from a village fire event.

Emergency events placing higher demand on the water supply can be satisfied using two additional water sources;

- Rocky Valley Dam – raw water can be supplied at 35L/s from the settling tanks
- Falls Creek Ski Lift Company – raw water can be supplied at 50L/s through snow making infrastructure. This water is sourced from Rocky Valley Dam.
  In the event of an emergency and high demand, the UV systems have the capability to treat and supply safe, compliant drinking water at 120L/s.

2.6 Demand

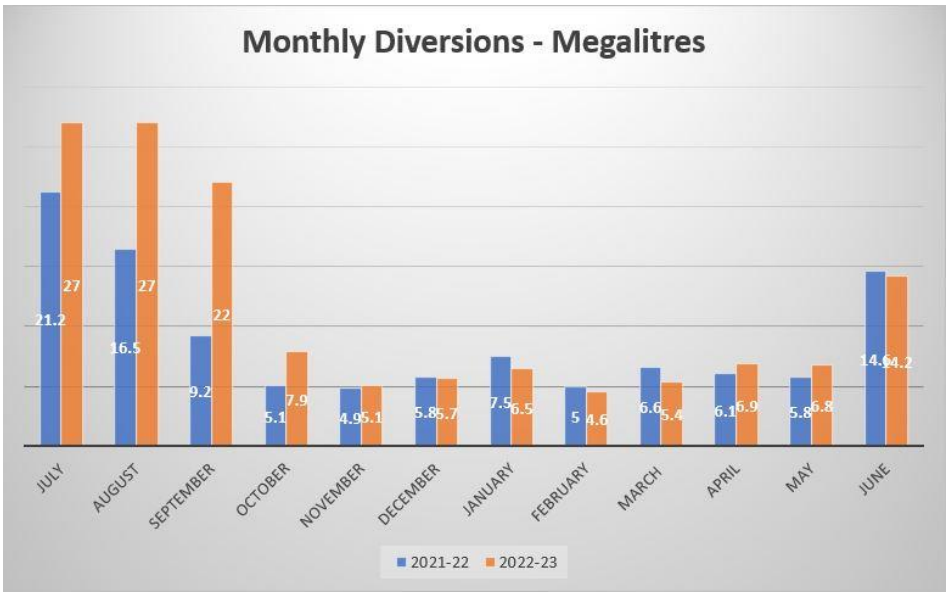
System demand varies with seasonal visitation and the average daily flow fluctuates from around 0.2 megalitres per day (ML/d) up to 1.1 ML/d during the peak of winter (population approx. 5600). The total volume consumed from the supply sources for the last four years is as per Table 1 below.

Table 2.1: Annual Water Diversions

Year	Volume Diverted (ML)
2022-23	139
2021-22	108
2020-21	117
2019-20	143

Water consumption for the 2022-23 reporting period increased closer to volumes seen pre-2020. The average demand for the six years prior to 2020 was 160ML per year. The 2022 ski season was one of the biggest on record with huge visitation. Unfortunately, the summer season was impacted due to the landslip on the Bogong High Plains Road, which closed the road and access to Falls Creek for six months.

The monthly diversions for the past two reporting periods are shown in the graph below:



2.7 Drinking Water Treatment Process – r.16(e)

Accumulation Tank and Calcite Filter

Water from the Production Bore and the Horizontal Bore is first collected in a 10kL Accumulation Tank. The very low measurements of both hardness and TDS in the groundwater meant that this water was relatively unbuffered and hence subject to pH excursions. The pH of the groundwater was observed in the range 5.5 – 5.8, which is outside the ADWG recommended range of 6.5 – 8.5. It is noted that the ADWG does not specify a Health Guideline Value and this range relates to aesthetic considerations. The hazard associated with low pH relates to the increased potential for corrosion and the subsequent dissolution of copper in pipe-work and brass fixtures.

The conventional treatment for these conditions involves passing the groundwater with through a Calcium Carbonate media. This is designed to increase the hardness of the water and stabilise any Carbonic Acid related pH excursions. The filtration capacity of the calcite filter may also reduce any suspended solids and turbidity in the groundwater.

The introduction of the Calcite Filter has achieved the desired effect. After calcite filtration, it was found that:

- pH increased from 5.8 to 6.8;
- Total Dissolved Solids increased from 21 to 91 mg/L;
- Electrical conductivity increased from 11 to 100 µS/cm; and
- Suspended solids decreased from 11 to less than 2 mg/L.

The Calcite Filter includes an alarmed pH monitor and is maintained with a periodic backwash and disinfection with Sodium Hypochlorite. This removes any traces of suspended solids or micro-organisms within the groundwater that may have collected and accumulated in the calcite medium. The backwash water is discharged to the drainage system.

UV Treatment

The UV Treatment Plant consists of two UV units incorporating 50:50 stream split duty cycling between the two units to ensure that both units are always available for duty, without any warm-up time lag. The UV systems are capable of treating and supplying compliant, safe, drinking water at 120L/s.

The UV Transmittance (UVT) analyser measures the UV transmittance of the incoming water from the Brown/Blue Storage Tanks as well as any reduction in the UV-C output from the lamps, due to aging. This UV transmittance, together with flow data, is communicated to each UV treatment unit via the UV plant automation system and the UV treatment unit adjusts the UV intensity to achieve the required water sanitisation conditions for the measured transmittance and flow rate.

The operation of the entire UV treatment process is visible on the SCADA system. The operator console displays the total flow through each UV unit, the instantaneous flow through each UV unit, the instantaneous UV intensity generated within each UV unit, and the raw water UV transmittance. As part of verification monitoring, FCAR ensure that the control room instrumentation is consistent with UV Treatment Unit readings undertaken as part of the daily system checks.

The UV Treatment Plant also includes an Uninterruptable Power Supply (UPS) and back-up generator rated to the full system load.

Table 2.2: Drinking Water Treatment Processes

Locality	Treatment Plant	Treatment Process	Added Substances	Comments
Falls Creek	Calcite Filter	Contact with Calcium Carbonate	Sodium hypochlorite	Sodium hypochlorite used for periodic backwash of calcite filter
	Disinfection Plant	UV treatment	Sodium Hypochlorite	Sodium hypochlorite is added twice annually to clean the reticulated network. It is also used for emergency situations where the primary disinfections system fails.

2.8 Issues

There were no direct issues with the operation of the treatment and disinfection system for the reporting period.

There was one incident requiring notification to the Department of Health under *Section 22 of the Safe Drinking Water Act.* This incident was an E.Coli detection in the treated water at the UV disinfection building.

This incident is discussed in section 2.11, *Known or Suspected Contamination Reported under Section22*

2.9 Chlorine based disinfection by-product chemicals

Falls Creek does not use chlorine-based disinfection products as a standard method of disinfection. Sodium Hypochlorite is only used twice annually to disinfect the reticulated network as a part of our preventative maintenance program.

A chlorine dosing system is in place and used for network maintenance. This is programmed twice annually to remove biofilm and flush the pipework. It is also in place for emergency situations in the event of primary disinfections systems failure.

Although chlorine is not used as a primary disinfection product THMs are monitored monthly as a part of the sampling program.

The results for THMs are shown in table 2.6.

2.10 Emergency, Incident and Event Management - r. 16(a) & 16(b)

Although preventive strategies are intended to prevent incidents and emergency situations from occurring, some events cannot be anticipated or controlled, or have such a low probability of occurring that providing preventive measures would be too costly. For such incidents, there must be the ability to respond promptly, constructively and efficiently.

There are a number of hazards or events that can lead to emergency situations, including:

- Treatment/disinfection failure;
- Failing to meet guideline values and other requirements;
- Accidents that increase levels of contaminants (e.g. spills in catchments, incorrect dosing of chemicals);
- Equipment breakdown and mechanical failure;
- Prolonged power outages;
- Extreme weather events (e.g. flash flooding, cyclones);
- Natural disasters (e.g. fire, earthquakes, lightning damage to electrical equipment); and
- Human actions (e.g. serious error, sabotage, strikes).

FCAR has a Municipal Emergency Management Plan (MEMP) as required under the *Emergency Management Act 1986* and this plan is regularly updated and audited. The action statement for a drinking water supply incident is detailed in Appendix C of the plan to meet the requirements of the Regulations. The plan includes details of, or clear references to, emergency management arrangements and procedures for dealing with an incident, event or emergency that may adversely affect the quality or safety of drinking water, or result in water being supplied that poses a risk to human health, including:

- the positions held by persons responsible for dealing with such an incident, event or emergency; and
- methods for disseminating information to the public in relation to any such incident, event or emergency;

The arrangements and documented procedures have been followed and modified, where the debrief meeting for a particular incident/event/emergency has identified that the procedure required modification.

The MEMP is audited every three years, however, is reviewed dynamically throughout the year as part of the Municipal Emergency Management Planning Committee process.

The Municipal Emergency Management Plan was revised in 2021 and approved by the Hume Regional Emergency Management Planning Committee on 14th May 2021.

2.11 Known or Suspected Contamination Reported Under Section 22

During the 2022-23 compliance period there was one incident that occurred requiring reporting to the Department of Health under *Section 22 of the Safe Drinking Water Act*. This incident was an *E. Coli* detection in the treated water at the UV building on the 30th of May 2023.
The detection was from the UV Building, site 024E01, from UV disinfection until two, post disinfection. It was an *E. Coli* reading of 1 orgs/100mL.

The investigation reviewed the following areas

- Sampling Procedure / Sample Location
- Water Quality

- Disinfection System
- SCADA & Controls System
- Network disinfection procedures
- Network and infrastructure condition assessment
- ALS Testing and Transport Procedure

Following a review of the investigation by the Department of Health it was considered that the sample was not representative of the water supplied and was a false positive. The findings from the investigation found that the *E. Coli* detection was likely caused by contamination by the operator during sample collection.

Notification was not made to the DH until seven days following the detection. The late notification was caused by ALS not notifying FCAR of the detection until one week after the event. The delayed notification was investigated by ALS and corrective actions were implemented to reduce the likelihood of this occurring in the future. FCRA's exceedance limits are now included in their automated notification software and reliance on the laboratory identifying and notifying for any exceedance has been removed.

Through the investigation FCAR identified two actions items for implementation to improve our sampling activities and reduce the likelihood of a recurrence of accidental contamination.

- Refresher training for operators on taking water samples
  - Training Scheduled for November 2023
- Review of internal sampling procedure
  - Completed on 7/08/2023

2.12 Situations not reportable under s. 22 which impacted or had the potential to impact the water quality, but not the safety, of the water supplied

There were no incidents which impacted the safety or quality of drinking water supplied during the reporting period.

2.13 Staff and Resourcing for Water Operations Department

The staff that are involved in the water operations department and their relevant qualifications are listed in the table below.

Table 2.3: Water Department Staff

Staff	Name	Service	Qualifications
Director of Infrastructure & Mountain Response	Callum Brown	10 years	Bachelor Engineering – Mechanical
Asset & Operations Manager	Fred Weir	15 years	Diploma of Water Industry Operations Diploma of Project Management
Water Treatment Plant Operator	Dave Hunt	16 years	Certificate III in Water Treatment
Water Treatment Plant Operator	Jack Percy (vacated10/06/23)	3 years	Certificate III in Water Treatment

2.14 Drinking Water Quality Standards – r. 16(f), 16(g) & 16(h)

Safe Drinking Water Regulations 2015

Drinking water supplied is required to meet water quality standards. All drinking water supplied at Falls Creek was compliant with the drinking water quality standards, and there was no notification was made to DH under s. 18 of the Act.

As per guidance page 10: Drinking water quality standards are specified in r. 12(a) and r. 12(b). Three drinking water quality standards are specified in Schedule 2 of the Regulations. Regulation 12(b) refers to drinking water quality standards not specified in Schedule 2, but are identified within the drinking water sampling program.

2.15 Schedule 2 Drinking Water Quality Standards – r. 12(a)

Escherichia coli (*E. Coli*)

Standard as stated in Schedule 2 of Safe Drinking Water Regulations 2015: All samples of drinking water collected are found to contain no *Escherichia coli* per 100 millilitres of drinking water, except for any false positive sample.

Presentation of the results for the reporting period, and the previous two financial years, are shown in the following table.

Table 2.4: *E. Coli* Sampling Results

Year	Sampling Frequency	No. of samples*	Maximum detected (orgs/ 100mL)	Number of detections and investigations conducted (s. 22)	No. of samples where standard was not met (s. 18)
2022-23	Weekly	104	1	1**	0
2021-22	Weekly	104	0	0	0
2020-21	Weekly	104	0	0	0

* Two locations are tested for *E. Coli* weekly. One in the reticulated network and the UV disinfection system. Therefore 104 weekly results were received.

***E. Coli* detection in treated water covered in section 2.11

Turbidity

Standard as stated in Schedule 2 of Safe Drinking Water Regulations: The 95th percentile of results for samples in any 12-month period must be less than or equal to 5.0 Nephelometric Turbidity Units (NTU) Presentation of the results for the reporting period, and the previous two financial years, are shown in the following table.

Table 2.5: Turbidity Sampling Results

Year	Sampling Frequency	No. of samples	Maximum turbidity in the sample (NTU)	Maximum 95th percentile of turbidity results in any 12-months (NTU	Number of 95th percentile of results in any 12-months above the standard
2022-23	Weekly	52	6.5	3.6	0
2021-22	Weekly	52	2.3	1.4	0
2020-21	Weekly	52	3.7	1.7	0

Trihalomethanes

Standard as stated in Schedule 2 of the Safe Drinking water Regulations: Less than or equal to 0.25 milligrams per litre of drinking water.
Presentation of the results for the reporting period, and the previous financial year, are shown in the following table.

Table 2.6: THMs

Year	Sampling Frequency	No. of samples	Drinking Water quality standard (mg/L)	Maximum (mg/L)	Average (mg/L)	No.of samples where standard was not met (s.18)
2022-23	Monthly	12	0.25	0.003	0.002	0
2021-22	Monthly	12	0.25	0.001	0.001	0
2020-21	Monthly	6*	0.25	0.008	0.0043	0

*Monitoring for THM's commenced part way through 2020-21 reporting period.

2.16 Other water quality parameters monitored that may pose a risk to human health – r. 12(b)

FCAR has consistently delivered good quality and safe drinking water. All parameters monitored have met the health guideline values stated in the ADWG during the last three reporting periods. Data recorded since 1997 shows that, apart from copper and manganese, all of these parameters have continually tested below the detectable limits. This is due to the combination of high-quality source water and good risk management practices. The results from the analysis of these parameters from samples collected from the groundwater source are all below the detectable limits and meet water quality standards.

Results for the reporting period are as shown in the Table below. All tested parameters met the health guideline values in the ADWG.

Table 2.7: Health Risk Parameters Sampling Results – Ground Water

Parameter	Frequency of Sampling	Number of Samples	Drinking water quality standard (mg/L)	Maximum test value (mg/L)	Standard Met
Arsenic	6-monthly	2	0.01	<0.001	YES
Cadmium	6-monthly	2	0.002	<0.0002	YES
Chromium	6-monthly	2	0.05	<0.001	YES
Copper	6-monthly	2	2	0.003	YES
Lead	6-monthly	2	0.01	<0.001	YES
Manganese	6-monthly	2	0.5	0.03	YES
Mercury	6-monthly	2	0.001	<0.0001	YES
Nickel	6-monthly	2	0.02	<0.001	YES
Selenium	6-monthly	2	0.01	<0.001	YES
Sulphur	6-monthly	2	250	<0.5	YES
Radium*	Five Yearly	0	0.5Bq/L	N/A	N/A

*Radium was not tested in 2023 per RMP sampling program. Next testing is scheduled for 2025.

Table 2.8: Health Risk Parameters Sampling Results – Surface Water

Parameter	Frequency of Sampling	Number of Samples	Drinking water quality standard (mg/L)	Maximum test value (mg/L)	Standard Met
Arsenic	6-monthly	2	0.01	<0.001	YES
Cadmium	6-monthly	2	0.002	<0.0002	YES
Chromium	6-monthly	2	0.05	<0.001	YES
Copper	6-monthly	2	2	0.013	YES
Lead	6-monthly	2	0.01	<0.001	YES
Manganese	6-monthly	2	0.5	0.006	YES
Mercury	6-monthly	2	0.001	<0.0001	YES
Nickel	6-monthly	2	0.02	<0.001	YES
Selenium	6-monthly	2	0.01	<0.001	YES
Sulphur	6-monthly	2	250	<0.5	YES
Radium*	Five Yearly	0	0.5Bq/L		N/A

*Radium not tested in 2023. Next testing is scheduled for 2025.

Table 2.9: Pesticide Analysis Results - December 2022

Parameter		Ground Water	Surface Water
PAH (LL) - Acenaphthene	mg/L	<0.00001	<0.00001
PAH (LL) - Acenaphthylene	mg/L	<0.00001	<0.00001
PAH (LL) - Anthracene	mg/L	<0.00001	<0.00001
PAH (LL) - Benz(a)Anthracene	mg/L	<0.00001	<0.00001
PAH (LL) - Benzo(a)Pyrene	mg/L	<0.000002	<0.000002
PAH (LL) - Benzo(b)Fluoranthene	mg/L	<0.00001	<0.00001
PAH (LL) - Benzo(g,h,i)Perylene	mg/L	<0.0001	<0.0001
PAH (LL) - Benzo(k)Fluoranthene	mg/L	<0.00001	<0.00001
PAH (LL) - Chrysene	mg/L	<0.00001	<0.00001
PAH (LL) - Dibenz(a,h)Anthracene	mg/L	<0.0001	<0.0001
PAH (LL) - Fluoranthene	mg/L	<0.00001	<0.00001
PAH (LL) - Fluorene	mg/L	<0.00001	<0.00001
PAH (LL) - Indeno(1,2,3-cd)Pyrene	mg/L	<0.0001	<0.0001
PAH (LL) - Naphthalene	mg/L	<0.00001	<0.00001
PAH (LL) - Phenanthrene	mg/L	<0.00001	<0.00001
PAH (LL) - Pyrene	mg/L	<0.00001	<0.00001
PAH (LL) - Total PAH	mg/L	<0.0001	<0.0001
OPP (LL) - Chloropyrifos	mg/L	<0.001	<0.001
OPP (LL) - Coumaphos	mg/L	<0.001	<0.001
OPP (LL) - Demeton-S	mg/L	<0.001	<0.001
OPP (LL) - Diazinon	mg/L	<0.001	<0.001
OPP (LL) - Dichlorvos	mg/L	<0.001	<0.001
OPP (LL) - EPN	mg/L	<0.001	<0.001
OPP (LL) - Fensulfothion	mg/L	<0.001	<0.001
OPP (LL) - Fenthion	mg/L	<0.001	<0.001
OPP (LL) - Malathion	mg/L	<0.001	<0.001
OPP (LL) - Methyl Parathion	mg/L	<0.001	<0.001
OPP (LL) - Monocrotophos	mg/L	<0.001	<0.001
OPP (LL) - Parathion	mg/L	<0.001	<0.001
OPP (LL) - Phorate	mg/L	<0.001	<0.001
OPP (LL) - Prophos	mg/L	<0.001	<0.001
OPP (LL) - Ronnel	mg/L	<0.001	<0.001
OPP (LL) - Tetrachlovinphos	mg/L	<0.001	<0.001
OPP (LL) - Tetraethyldithiopyrphos	mg/L	<0.001	<0.001
OPP (LL) - Trichlorinate	mg/L	<0.001	<0.001
OPP (LL) - Tukuthion	mg/L	<0.001	<0.001

Parameter		Ground Water	Surface Water
OCP (LL) - 2,4,5,6-tetrachloro-m-xylene	%	125.064812	128.014812
OCP (LL) - 4,4'-DDD	mg/L	<0.00006	<0.00006
OCP (LL) - 4,4'-DDE	mg/L	<0.00006	<0.00006
OCP (LL) - 4,4'-DDT	mg/L	<0.00006	<0.00006
OCP (LL) - Sum of Aldrin and Dieldrin	mg/L	<0.00001	<0.00001
OCP (LL) - Aldrin	mg/L	<0.00001	<0.00001
OCP (LL) - BHC (Alpha Isomer)	mg/L	<0.00005	<0.00005
OCP (LL) - BHC (Beta Isomer)	mg/L	<0.00005	<0.00005
OCP (LL) - BHC (Delta Isomer)	mg/L	<0.00005	<0.00005
OCP (LL) - Chlordane	mg/L	<0.00001	<0.00001
OCP (LL) - cis-Chlordane	mg/L	<0.00001	<0.00001
OCP (LL) - Sum of DDD, DDE and DDT	mg/L	<0.00006	<0.00006
OCP (LL) - Dieldrin	mg/L	<0.00001	<0.00001
OCP (LL) - Endosulfan I	mg/L	<0.00005	<0.00005
OCP (LL) - Endosulfan II	mg/L	<0.00005	<0.00005
OCP (LL) - Sum of alpha-, beta- and Endosulphan Sulphate	mg/L	<0.00005	<0.00005
OCP (LL) - Endosulphan Sulphate	mg/L	<0.00005	<0.00005
OCP (LL) - Endrin Aldehyde	mg/L	<0.0001	<0.0001
OCP (LL) - Endrin Ketone	mg/L	<0.00005	<0.00005
OCP (LL) - Endrin	mg/L	<0.0001	<0.0001
OCP (LL) - Heptachlor Epoxide	mg/L	<0.00005	<0.00005
OCP (LL) - Heptachlor	mg/L	<0.00005	<0.00005
OCP (LL) - Hexachlorobenzene	mg/L	<0.000002	<0.000002
OCP (LL) - Lindane (BHC Gamma Isomer)	mg/L	<0.00005	<0.00005
OCP (LL) - Methoxychlor	mg/L	<0.0002	<0.0002
OCP (LL) - Oxy-Chlordane	mg/L	<0.0001	<0.0001
OCP (LL) - trans-Chlordane	mg/L	<0.00001	<0.00001
Phenols(Halo) - 2,3,4,5-Tetrachlorophenol	mg/L	<0.001	<0.001
Phenols(Halo) - 2,3,4,6-Tetrachlorophenol	mg/L	<0.001	<0.001
Phenols(Halo) - 2,3,5,6-Tetrachlorophenol	mg/L	<0.001	<0.001
Phenols(Halo) - 2,4,5-Trichlorophenol	mg/L	<0.001	<0.001
Phenols(Halo) - 2,4,6-Trichlorophenol	mg/L	<0.001	<0.001
Phenols(Halo) - 2,4-Dichlorophenol	mg/L	<0.001	<0.001
Phenols(Halo) - 2,6-Dichlorophenol	mg/L	<0.001	<0.001
Phenols(Halo) - 2-Chlorophenol	mg/L	<0.001	<0.001
Phenols(Halo) - 2-Fluorophenol	%	81	78

Parameter		Ground Water	Surface Water
Phenols(Halo) - 4-Chloro-3-Methylphenol	mg/L	<0.001	<0.001
Phenols(Halo) - Pentachlorophenol	mg/L	<0.001	<0.001
Phenols(Halo) - Total Phenols (Halogenated)	mg/L	<0.001	<0.001
Phenols(NonHalo) - 2,4-Dimethylphenol	mg/L	<0.001	<0.001
Phenols(NonHalo) - 2-Fluorophenol	%	81	78

2.17 Drinking Water Quality Reports – s.23

FCAR met all water quality standards for the reporting period. Section 23 of the Act requires FCAR to make available for inspection by the public the results of the water quality monitoring program. Customer and members of the public may access drinking water quality data by contacting FCAR on (03) 5758-1200 during business hours or by email to fcrm@fallscreek.com.au

2.18 Actions in Relation to Non-Compliance

FCAR has no outstanding actions with the Department of Health.

2.19 Aesthetic Guidelines

Drinking water parameters monitored to manage aesthetic quality of the water supply are presented in the following table. All parameters tested met the ADWG aesthetic guideline values for the reporting period.

Table 2.10: Aesthetic Parameters Sampling Results
Surface Water

Parameter	Frequency of Sampling	Number Samples	Units	Mean Value	Maximum test value	Minimum test value	ADWG Guideline
Total Dissolved Solids	6-monthly	2	mg/L	<5	<5	<5	1000
Total Alkalinity	6-monthly	2	mg/L	3	4	2	N/A
Calcium	6-monthly	2	mg/L	0.85	1.2	0.5	N/A
Chloride	6-monthly	2	mg/L	<1	<1	<1	250
Hardness	6-monthly	2	mg/L	3	4	2	200
Iron*	6-monthly	2	mg/L	0.1	0.13	0.07	0.3
Magnesium	6 Monthly	2	mg/L	0.2	0.2	0.2	N/A
Potassium	6 Monthly	2	mg/L	0.2	0.2	0.2	N/A
Sodium	6 Monthly	2	mg/L	0.5	0.5	0.5	180
Zinc	6 Monthly	2	mg/L	0.003	0.002	0.004	3

*The dam was not in use when the samples were taken.

Table 2.11: Aesthetic Parameters Sampling Results Ground Water

Parameter	Frequency of Sampling	Number Samples	Units	Mean Value	Maximum test value	Minimum test value	ADWG Guideline
Total Dissolved Solids	6-monthly	2	mg/L	16.5	23	10	1000
Total Alkalinity	6-monthly	2	mg/L	3.5	5	2	N/A
Calcium	6-monthly	2	mg/L	0.52	1	0.4	N/A
Chloride	6-monthly	2	mg/L	<1	<1	<1	250
Hardness	6-monthly	2	mg/L	3	4	2	200
Iron	6-monthly	2	mg/L	<0.01	<0.01	<0.01	0.3
Magnesium	6 Monthly	2	mg/L	0.25	0.3	0.2	N/A
Potassium	6 Monthly	2	mg/L	0.2	0.2	0.2	N/A
Sodium	6 Monthly	2	mg/L	0.42	1.2	0.7	180
Zinc	6 Monthly	2	mg/L	0.006	0.006	<0.001	3

2.20 Actions undertaken where aesthetic guideline value is not satisfied.

There were no actions required where an aesthetic guideline was not met within the reporting period.

2.21 Water Quality Complaints – r. 16(j)

There were no complaints received from customers during this reporting period or the previous two reporting periods.

Table 2.12: Water Quality Complaints Summary

Type of Complaint	2022/23 No of Complaints	No. of complaints per 100 customers supplied.	2021/22	2020/21
Discoloured water	0	0	0	0
Taste/Odour	0	0	0	0
Blue water	0	0	0	0
Air in water	0	0	0	0
Suspected illness	0	0	0	0
Other	0	0	0	0

2.22 Risk Management Plan Audit Results – r. 16(d)

FCAR conducted an audit of the Water Supply Risk Management Plan in March 2023. The audit is executed to ensure compliance with the conditions outlined in the Safe Drinking Water Act 2003, Section 7(1).

The audit is executed once every two years. Auditors must be certified under the Exemplar Global Incorporated Water Quality Management Systems and approved by DH. Falls Creek Resort Management was found to be compliant with the conditions outlined in Section 7(1) of the Safe Drinking Water Act 2003.

The audit report identified Opportunities for Improvement (OFIs) for FCAR to ensure continuous improvement with water operations. The OFIs and FCAR response are listed in the table below.

Table 2.13: Audit OFIs Summary

Item	Identified OFI	Activity	Status
1	Review the risk ratings in Appendix 5 of RMP with new knowledge	Broad risk management plan review for ARV portfolio to be undertaken in 2024.	In Progress
2	Look for new ideas to continually minimise the risks to the water supply.	Per OFI 1 above.	In Progress
3	Improve by digitising the water systems key elements and attaching them to the RMP.	Per OFI 1 above.	In Progress
4	Undertake trend analysis for key WQ parameters to understand the system behaviour over time to minimise risks.	Per OFI 1 above.	In Progress
5	Consider a few additional parameters that could benefit operational monitoring.	Partial roll out of flow and pressure monitoring in progress. TOC monitoring also under consideration.	In Progress
6	Undertake a full review of the flow and intensity settings of the UV system.	Per OFI 1 above.	In Progress
7	Implement the Bore Management Plan as per the GHD report 2015.	Requirements to be added to asset information management system by end 2023.	In Progress
8	Consider additional safeguards to alarm out in the event of negative pressure in the network.	To be executed as part of pressure/flow monitoring project.	In Progress

2.23 Undertakings – r. 16(c)

FCAR does not have any undertakings with the Department of Health.

2.24 Regulated Water – r. 16(l) & 16(m)

FCAR does not manage any regulated water supplies.

2.25 Aesthetic standard variations r. 16(i)(i)

Not applicable to FCAR.

2.26 Exemptions r. 16(i)(ii)

Not applicable to FCAR.

3. Mt Hotham Alpine Resort

3.1 Introduction

Mt Hotham Alpine Resort is located toward the southern end of the Great Dividing Range, approximately 365 kilometres north-east of Melbourne and 520 kilometres south-west of Canberra. Mt Hotham is the highest of all the Victorian alpine resorts with a summit elevation of 1861 metres above sea level (asl). The area is comprised of sharp and slightly rounded peaks connected by ridgelines, incised by steep watercourses and gullies. The resort is located at the headwaters of four major river catchments: the Kiewa, Mitta Mitta, Dargo (Mitchell) and Ovens. The resort encompasses an area of approximately 3,030 hectares, the majority of which is Crown Land, and is bounded on all sides by the Alpine National Park.

The average annual precipitation, including snowfall and rainfall, is over 1450 millimetres. Snowfalls that create and maintain a persistent snow cover usually begin about mid-June and continue intermittently until early September.

The population, and consequent demand for water, is highly seasonal. At the 2021 census, Hotham Heights recorded a permanent population of 128. The village supports administrative, retail, and commercial business as well as a large variety of accommodation, with a total of approximately 5,225 beds. The 2022 snow season (17-weeks from early June to October) saw the highest visitation rate on record with an average of 4097 people in the resort each day (467,498 visitor days). Visitation in 2020 & 2021 was very low due Covid-19 restrictions, but for comparison, in the 2019 snow season, the average visitors in the resort each day was approx. 3300.

Alpine Resorts Victoria trading as Mt Hotham Alpine Resort (MHAR) is the authority responsible for supplying drinking water to the Mt Hotham village and operates under the *Alpine Resorts (Management) Act* 1997 (incorporating 1 Oct 2022 amendments), which states a key function of Alpine Resorts Victoria include to arrange for the provision of services for each alpine resort as deemed necessary, including water supply.

Drinking Water Objective

MHAR strives to provide the delivery of quality, reliable services that meet customer needs and contribute to the ongoing viability of the resort. MHAR is defined as a water supplier under the *Safe Drinking Water Act 2003* and aims to provide a high-quality drinking water supply. The Mt Hotham Drinking Water Quality Policy sets out the approach and commitment of the MHAR to provide reliable delivery of safe drinking water that meets customer needs, supports growth and development in our customer base, responsibly manage risks to water quality, and satisfy the requirements of the Act.

3.2 Overview

Table 3.1 Source of water

Water Sampling Locality	Population supplied	Source Water	Storage	Treatment Plant
Mt Hotham	October to May less than 200, June to September average 3500 per day.	Upper Swindlers Creek	Mt Higginbotham	UV 1 or UV 2

Water is sourced from Upper Swindlers Creek, a catchment of approximately 177 hectares. Water is collected at the Swindlers pipeline inlet headwall and raw water is gravity fed to the pump station before being pumped through a pressure rising main to storage tanks located at the summit of Mt Higginbotham. From the storage tanks, raw water flows to the ultraviolet (UV) units 1 and 2 where it is disinfected immediately prior to its distribution to customers through the village water reticulation system. The water supply system is outlined in Table 1 and a working overview is shown in Figure 1. The key components of the water supply system are detailed in Figure 1.

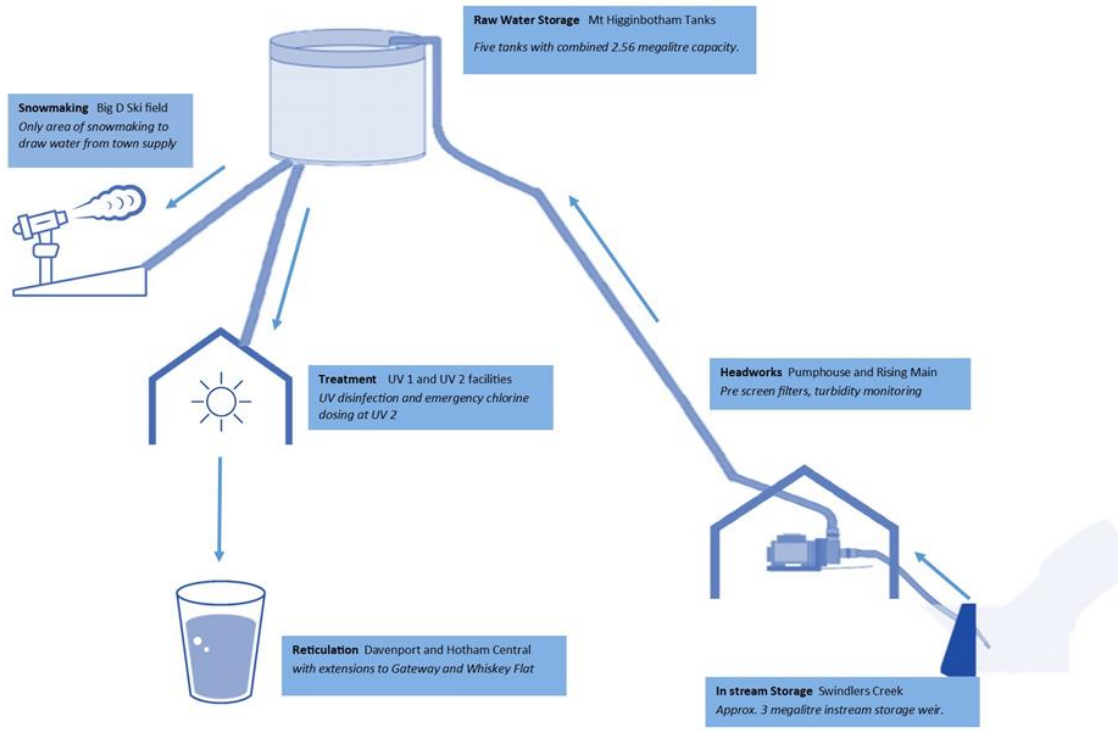


Figure 3.1. Schematic overview of water supply system

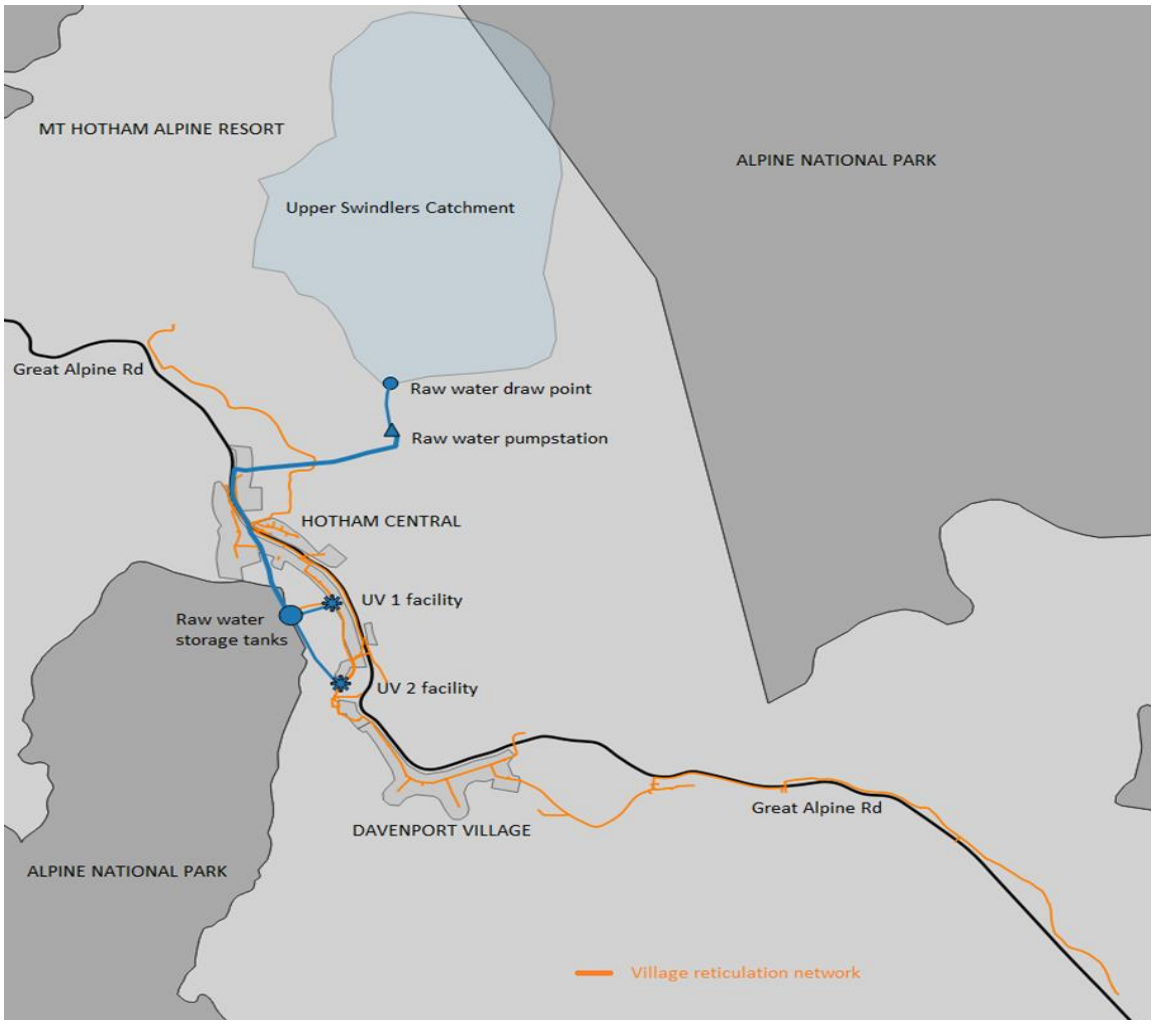


Figure 3.2. Key components of the drinking water supply system within the Mt Hotham Alpine Resort.

In stream storage

Swindlers Creek flows through an inlet structure and pipeline. The inlet headwall, constructed in early 2016, expanded the previous storage volume to 3 megalitres. It is accessible via an access track for maintenance works. The inlet is a reinforced concrete structure comprising an instream headwall approximately 20 meters wide and 5 meters high with grill and tapered walls to direct flows and accelerate water into the Swindler's Valley Pipeline. The headwall's draw point is fitted with an 18 mm screen filter over the gravity feed pipeline.

Headworks

The pump station houses two multi-stage vertical turbine pumps with two multi-stage pumps as emergency backup. A back-up emergency generator is housed in an annex of the pump house to provide electrical supply in the event of mains power failure. Raw water is pumped up the rising main to storage tanks on the summit of Mt Higginbotham.

The rising main steel pipeline was constructed in 1972 and has been highlighted for replacement within MHAR's Asset Management Systems. MHAR commenced staged replacement of the rising main in 2019 with completion scheduled within five years. To date significant works to the lower section of the main have been undertaken, however the steep slope means that the work can only be done in dry weather. Work was limited during the 2021-22 summer, and no work was possible for the 2022-23 summer due to the continual wet weather.

An in-line turbidity meter is incorporated into the Supervisory Control and Data Acquisition (SCADA) monitoring system and allows continuous monitoring and recording of the turbidity levels of the raw water being supplied to the pump house. Additionally, the SCADA system provides continuous monitoring of raw water turbidity as it enters the pump house and has a high limit interlock of 5 NTU which prevents pumps from operating and conveying turbid water to the storage tanks.

Raw water bulk storage

Five storage tanks with a total capacity of 2.56 megalitres are located on Mt Higginbotham. Three of the tanks are at, or approaching, end of life. MHAR has successfully secured funding for a new raw water storage tank. It is intended to demolish the three smaller tanks on site and construct a new 2.2ML tank during the summer of 2023-24. Design work is underway for the valve housing shed, pipework and construction of a concrete tank. The housing shed will allow safer year-round access for management on site and the new tank will double the current storage capacity at the site.

Treatment

The stored raw water flows to one of two UV facilities for disinfection before entering the reticulation system for supply to consumers. Two high intensity medium pressure UV lamp chamber units exist at the UV #1 and UV #2 facilities. The UV #2 facility is the primary disinfection system while the UV #1 facility provides additional capacity, maintenance, and redundancy.

In the event of an interruption to mains power supply at the main UV #2 facility, a fully automated emergency backup generator and chlorine dosing system ensures that no loss of disinfection to the drinking water supply occurs. The automated system is made up of the following elements:

- auto change over switch,
- dosing pump, and
- an uninterruptible power supply unit.
- diesel generator

In conjunction with the SCADA, the system provides a transitional power supply and immediate "start-up" of the chlorine dosing pump during mains to generator change over and the resultant 20-minute delay required before restarting the reactor lamps. Once the lamp time delay has passed, the SCADA system restarts the UV reactor and turns off the chlorine dosing.

Regular routine maintenance of both UV reactors was completed during the 2022-23 reporting period as well as maintenance to other system elements.

Reticulation

All drinking water supplied through the reticulation network is gravity fed with no pumps involved. Two interconnected static head systems (East and West) supply all parts of the village. Within the Davenport village area, a linear main exists, while the Hotham Central area is supplied via a ring main. Annual mains scouring occurs prior to each winter ski season as well as ongoing staged mains disinfection.

Snowmaking
The snow making water reticulation is largely independent of the drinking water supply system. Most of the snow making capability is supplied by a separate weir which is situated downstream of the drinking water weir in Swindlers Creek. Only the snow making operation on Big D Ski area draws water from the drinking water storage tanks.

The SCADA system enables continual monitoring of water demand from snowmaking to ensure drinking water supply is not compromised. Snow melt of artificial snow in the Milky Way area of Heavenly Valley may enter Swindlers Creek just above the drinking water weir, however associated risks are deemed low as this area is small in comparison to the larger catchment and the dilution factor would be high.

Realtime Monitoring
The SCADA system provides continuous real time supervision and control as well as historical data collection from the critical infrastructure sites within the resort that make up the drinking water supply system.
The SCADA system is linked to the Swindlers Inlet Weir, the raw water pump house, Mt Higginbotham water storage tanks and the UV #1 and UV #2 facilities (including the emergency backup generator and chlorine dosing systems). Swindlers Inlet Weir and the pump house points collect data regarding weir levels, pressure drop across the inlet filters (indicating if filters require maintenance), availability of water for pumps and flow path for pumps, flow rate and total flows, continuous turbidity monitoring (with a high limit set point to prevent pumping turbid water to tanks), and alarm notification of any electrical or mechanical faults with pumps. Further monitoring points at the Mt Higginbotham storage tanks record water storage levels.

Monitoring within the UV #1 and UV #2 facilities includes flow rates and flow totals, status, UV intensity, lamp hours and alarm notification of electrical and lamp faults. Monitoring of emergency backup generator status and fault alarms as well as emergency chlorine dosing pump status and dose rates are conducted within UV #2. Each location has on-site computer access to SCADA, as well as remote access at MHAR Technical Services office.

The SCADA system further enhances MHAR's ability to manage and operate its drinking water systems elements. It provides the ability to respond to emergency or breakdown incidents, protection of important assets within the system at times outside of normal working hours and ensures provision of drinking water that meets the water quality standards specified by the Act and the Regulations.

3.3 Water Quality Monitoring & Reporting

MHAR monitors water quality to ensure the supply of safe, high quality drinking water to consumers and to meet regulatory compliance, weekly drinking water samples are collected and tested for *E. coli* and turbidity. Samples are taken at two points; immediately after UV treatment and at two of several designated consumer tap points throughout the resort. These samples are also tested for coliforms. Monthly sampling is also taken from the raw water weir and just prior to UV treatment for *E. coli* and coliforms. The water sampling results are discussed in MHAR's annual report on drinking water quality, which is submitted to the Department of Health each year.

Emergency chlorine dosing is only required infrequently during unplanned power outages and then only for short durations while the emergency back-up power supply re-starts the UV disinfection unit. MHAR monitors for trihalomethanes once per month and results are presented as part of the annual report.

MHAR does not undertake any regular monitoring of other pathogens, chemicals, substances, or algae in the drinking water. UV treatment is the predominant method used to disinfect drinking water at Mt Hotham. The inlet headwall is not subject to algal blooms due to cool temperatures, low nutrient load and generally strong water flow through the weir. The drinking water catchment is of pristine nature with very little development (ski-lift and associated infrastructure). Following a detailed risk assessment of the Mt Hotham drinking water catchment and supply it was deemed not necessary to conduct regular monitoring for other pathogens, chemicals, substances, or algae other than *E. coli* and turbidity as risk was considered low

3.4 Source Water

The source of the village water supply is the upper reaches of Swindlers Creek. The upper Swindlers Creek watershed is a protected catchment comprising groundwater source, snow melt and precipitation within a 177 hectares area (Foresight Engineering, 2011) between 1800m asl and 1450m asl. Several small tributaries deliver reliable flows to Swindlers Creek for most of the year and flows are significantly augmented during rain events. There is limited development within the catchment with winter ski field activity and no regular human habitation or sewerage discharge.

The MHAR has adopted the Water Services Association of Australia (WSAA) Health Based Targets (HBT) approach to assessing source challenges, water treatment capability and performance. The source water catchment is assessed based on raw water microbial indicator levels and a sanitary survey. This information allows a catchment to be defined a category for which the recommended minimum pathogen reduction requirements for reference bacteria, viruses and protozoa are predetermined. The pathogen reduction requirements for each source waters can be compared to the pathogen reduction currently achieved by the treatment processes in place. If the treatment process is robust enough to remove the minimum pathogens required by the source water assessment, then the water safety continuum status will be 'safe' as the HBT is met.

The Upper Swindlers catchment can be classified as Category *1 Source (Fully Protected Catchment)* as the following has been considered during assessment:

- No permanent human habitation within the catchment,
- Negligible human impact, low intensity activity primarily during winter ski season,
- Winter ski activity is well monitored,
- No sewerage discharge within the catchment,
- Limited population of pest animals – ongoing monitoring and control works,
- No stock animals present in catchment,
- Natural landscape/bushland with well vegetated riparian zone along streams,
- Increased capacity in raw water storage supply in May 2016, and
- Locked gates to tracks to prevent recreational vehicle access.

In addition to the cold-water temperatures occurring in Swindlers Creek, the construction of the headwall to the Swindlers Creek pipeline in 2016 resulted in an approximate 3 megalitres of instream storage capacity which together with the raw water storage tanks together allow additional detention time to further reduce pathogen occurrence. This can be verified by results from monthly raw water monitoring collected for over 12 years with sampling points at the on-stream storage weir and immediately prior to disinfection within the UV 2 facility for *E. coli* and coliforms.

This data allowed for long term comparisons for pathogen levels within the on stream, off stream and treatment facilities. This data confirms through microbial indicator assessment the source water can be considered Category 1. The MHAR has deemed current UV treatment processes for the source waters of Upper Swindlers as “safe”.

Regular raw water monitoring provides operational staff an early warning indicator of potential issues within the catchment to inform overall catchment health. An annual catchment survey is undertaken to monitor and record any changes within the catchment that may impact on source water quality.

3.5 Drinking Water Treatment Processes

Table 3.3. Water treatment processes

Water Sampling Locality	Treatment Process	Added Substance
Mt Hotham	UV (Chlorination upon UV disinfection failure)	NIL Sodium hypochlorite on UV disinfection failure

All drinking water is disinfected by means of UV radiation immediately prior to distribution to consumers. There are two UV treatment systems in operation; UV #2 is the primary system and UV #1 provides additional capacity, maintenance, and redundancy. Regular maintenance of the UV disinfection system consists of:

Daily checks of UV reactors, chlorine dosing pump and supply level, and pipework during winter.

- Monthly replacement of chlorine supply.
- Weekly water sampling and testing.
- Annual cleaning of the reactor chamber.
- Annual cleaning of lamps and sleeves; and
- Scheduled replacement of lamps and sleeves.

Annual maintenance procedures are normally carried out in June, prior to the commencement of the peak winter ski season.

The SCADA system records the lamp replacement interval as well as real time UV intensity. Globes are replaced after 8,000 operating hours. In the event of power supply failure to the unit and subsequent disablement of the UV system, an automated emergency chlorine dosing facility ensures ongoing disinfection of the water supply. Upon the UV system being resumed, the chlorine facility will automatically cease dosing. When maintenance periods are being conducted the alternative UV facility is activated to achieve ongoing disinfection of water supply.

3.6 Issues

There have been no issues identified with the drinking water treatment and supply system within the July 2022 to June 2023 reporting period.

3.7 Emergency, Incident and Event Management

Known or suspected contamination reported under section 22.

No incidents occurred impacting drinking water requiring to be reported to Department of Health under section 22 of the Act during the 2022-23 reporting period. There were also no incidents that had the potential to impact on water quality during the 2022-23 reporting period.

3.8 Drinking water quality standards 2022-2023

Drinking water quality standards specified for water supplied within a water sampling locality are stated within Schedule 2 of the Safe Drinking Water Regulations 2015. To ensure the supply of safe, high quality drinking water to consumers and to meet regulatory compliance, weekly drinking water samples are collected and tested for *E. coli* and turbidity. Samples are taken at two points; immediately after UV treatment and at two of several designated consumer tap points throughout the resort. Monthly sampling is also taken from the raw water weir and immediately prior to UV treatment. Collected samples are then couriered to a NATA accredited laboratory.

Samples are also tested for coliforms to help provide an early warning of any gradual loss of efficiency of the UV disinfection system. Raw water microbial monitoring is carried out to maintain an ongoing awareness of raw water quality and to provide an early warning of any contamination that may have arisen within the catchment.

Escherichia coli

Schedule 2 of the Safe Drinking Water Regulations states all samples of drinking water collected must be found to contain no *Escherichia coli* (*E. coli*) per 100 millilitres of drinking water. No samples collected during the reporting period detected *E. coli,* therefore the MHARMB was found to be 100% compliant with the *E. coli* water quality standard during the 2022-23 reporting period (Table 4).

Table 3.4. *E. coli* detections of drinking water for the locality of Mt Hotham between July 2022 and June 2023.

Water sampling locality	Frequency of sampling	Number of samples	Maximum detected (orgs/100mL)	Number of detectives and investigations conducted (s. 22)	No of investigations where standard not met (s.18)
Mt Hotham	Weekly	52	0	0	0

Trihalomethanes

UV treatment is the predominant method used to disinfect drinking water at Mt Hotham. Emergency chlorine dosing is only required infrequently during unplanned power outages and then only for short durations while the emergency back-up power supply re-starts the UV disinfection unit. MHAR monitors for trihalomethanes once per month. Mt Hotham met the water quality standard of total trihalomethanes less than or equal to 0.25 milligrams per litre of drinking water during the 2022-23 reporting period (Table 5).

Table 3.5. Trihalomethane detections of drinking water for the locality of Mt Hotham between July 2022 and June 2023.

Water sampling locality	Frequency of sampling	Number of samples	Drinking water quality standard (mg/L)	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met (s. 18)
Mt Hotham	Monthly	12	0.25	0.072	<0.01	0

Turbidity

Schedule 2 of the Safe Drinking Water Regulations states the 95th percentile of results for samples in any 12-month period must be less than or equal to 5 Nephelometric Turbidity Units (NTU). Mt Hotham met the turbidity water quality standard during the 2022-23 reporting period (Table 6).

Table 3.6. Turbidity results for drinking water for the locality of Mt Hotham between July 2022 and June 2023.

Water sampling locality	Frequency of sampling	Number of samples	Max turbidity in a sample (NTU)	Maximum 95th percentile of turbidity results in any 12 months (NTU)	Number of 95th percentile of results in any 12 months above standard (s.18)
Mt Hotham	Weekly	52	0.4	0.3	0

3.9 Chlorine based disinfection by-product chemicals.

Chlorine is only used to disinfect drinking water as an emergency back up for a very short period when the UV lamps have failed or are not able to be used. As chlorine is not used on a long-term basis, only trihalomethanes are monitored and reported, at the locality.

3.10 Other pathogens, chemicals, substances, or algae that may pose a risk to human health.

Based on a detailed risk assessment that considered the risks to be low; MHAR does not undertake any regular monitoring of other pathogens, chemicals, substances, or algae in the drinking water other than those mentioned previously. The source water catchment is pristine, and Swindlers' weir is not subject to algal blooms due to cool temperatures, low nutrient load and generally strong water flows.

3.11 Aesthetic characteristics

Aesthetics parameters including iron, hardness and colour are not formally assessed at Mt Hotham. MHAR, as the water supplier, has determined that it is appropriate that no long-term aesthetic characteristics monitoring is necessary. There have been no reported issues with regards to taste, odour or colour of the drinking water supplied within the Mt Hotham water locality.

3.12 Analysis of results

MHAR has been compliant with the water quality standards for over seven years. Results for the past three reporting periods are presented below (Table 7). MHAR recognizes the good quality of the source water as well as well-maintained and serviced water treatment processes and systems has resulted in an ability to deliver good quality, safe drinking water to the Mt Hotham Resort. 100% of drinking water samples collected and analysed during the 2020-21, 2021-22 and 2022-23 reporting periods met the standards for *E. coli,* turbidity and trihalomethanes.

Table 3.7. Comparison of water quality parameters for 2020-21, 2021-22 and 2022-23.

	E. coli		Turbidity		THM		
Year	No of samples containing E.coli	% of samples with no E.coli	Max NTU	95th percentile	Max mg/L	% of samples ≤ 0.25 mg/L?	Compliance with standards?
2020-21	0	100	1.5	0.2	<0.001	100	Yes
2021-22	0	100	0.5	0.2	<0.001	100	Yes
2022-23	0	100	0.4	0.3	<0.001	100	Yes

**Monitoring for THMs began in April 2021.*

3.13 Complaints relating to water quality.

MHAR did not receive any complaints relating to its drinking water quality or supply during the 2022-23 reporting period nor for the previous five reporting periods. MHAR's water treatment processes and systems continue to result in quality water supply to the Mt Hotham Resort

3.14 Risk Management Plan audit results

The Secretary to the Department of Health Services required MHAR to undertake an audit of their risk management plan for the period between 1 January 2021 and 31 December 2022. The MHAR Drinking Water Quality Risk Management Plan was found not to comply with the obligations of section 7(1) of the Act. Four minor non-compliances were identified (refer to Table 3.8) and a number of opportunities for improvement (OFI's) were suggested by the auditor. Progress on ongoing OFI's from 2017-18 audit and 2019-20 audit are identified in Table 3.9 as well as those from the recent 2021 – 22 audit period.

Table 3.8. Minor Non-Compliance Items

Ref to Act and Reg	Audit Finding Summary
s. 9(1)(d)	Development and implementation of preventative strategies (including appropriate control and monitoring measures). **Refer to OFI 3**
s. 9(1)(d)	Development and implementation of preventative strategies (including appropriate control and monitoring measures). **Refer to OFI 4**
r. 8(1)(d)(v)	Details of a water sampling program that specifies the basis on which the location for the collection of a particular sample will be determined, to ensure that, for the purposes of routine sampling, samples are not taken from the same collection point within a water sampling locality on two consecutive occasions. **Refer OFI 7**

r. 8(1)(i)(i) r. 8(1)(i)(ii) r. 8(1)(i)(iii)	If the risk management plan is prepared by a water agency that operates and maintains a drinking water treatment process, it must contain - (i) all critical control points in the system of supply; and (ii) the critical limits relevant to each critical control point that is detailed in the risk management plan; and (iii) any actions, procedures, processes, policies, standards, or guidelines that are applied when a critical limit is exceeded. **Refer to OFI 9**

Table 3.9. Audit OFIs Summary

OFI ID	Opportunities for Improvement	Actions	Status
2017-2018 OFI - 3	The project to replace the rising main is a high priority. It is very important to budget for proactive replacement.	The rising main replacement is a very unique and challenging project due to the environment and terrain. Significant progress has already been made. Works scheduled in summer 2022/23 were delayed due to wet weather conditions, funds have been rolled over until 2023/24 and resourcing made available assuming weather conditions allow.	OPEN – ongoing works
2019-2020 OFI-2	Also, a high priority is the upgrade of the old clear water storage tanks (2); suggest replacing with a new modern tank with increased capacity	All approvals have been received and grant funding secured from the Federal Government. Works are scheduled to commence on site in October 2023. Design for the new 2.2 mL concrete storage tank is nearing completion. The existing conditions of storage tanks currently on-site at Mt Higginbotham are as follows: 2 x 80 kL concrete tank (decommissioned) 1 x 420kL concrete tank (currently on-line) 1 x 795kL steel tank (currently on-line) 1 x 1.2 mL steel tank (currently on-line) Total number of existing tanks currently on-site – 5. Total current volume of raw water stored capacity – 2.415mL. To make way for the new 2.2mL concrete tank, the existing 420kL concrete tank will also be disconnected and demolished along with the two 80kL tanks. The revised site capacity will be	OPEN
2021-2022 OFI - 1	An opportunity for improvement exists, in relation to r. 8(3)(a)(iii), to identify and include in the risk assessment process the risk of Trihalomethane (THM) disinfection by-product formation when chlorination disinfection is used.	The process to assess the risks regarding the formation of Trihalomethane (THM) disinfection byproducts in the drinking water supply, has been undertaken and included in the Risk Register.	CLOSED
2021-2022 OFI - 2	An opportunity for improvement exists, in relation to s. 9(1)(d), to disconnect the raw water pipeline bypass of the disinfection treatment process that connects directly to the drinking water reticulation. A failure of the raw water bypass pipeline valve or accidental operation may present a drinking water quality risk without implementation of further preventative strategies.	Alterations to the existing raw water bypass pipework are proposed for the 2023-24 Summer works program, following the finalisation of maintenance budgets and works programs. These alterations will ensure there is no possibility of undisinfected water entering the drinking water reticulation network and compromising drinking water quality.	OPEN

2021-2022 OFI - 3	An opportunity for improvement exists, in relation to s. 9(1)(d), to improve the UV disinfection system control measure in place to provide an immediate alert if performance is suboptimal i.e., UVI is < 80% is detected. The current situation may pose a drinking water quality safety risk, in the event of suboptimal UV performance (adequate disinfection may not occur), in that it may not be corrected in a timely manner. The appropriate action is to equip the SCADA system with an alarm feature to immediately notify of suboptimal performance and set in motion the required corrective action(s).	MHAR have engaged our SCADA Control System Technician to develop the necessary programming code for the PLC located at the UV#2 facility. This will enable an SMS alarm to be sent to Technical Services Water Operations personnel, should the UV intensity level fall below 90%. This feature will immediately notify of suboptimal performance and set in motion the required corrective action(s).	OPEN
2021-2022 OFI - 4	An opportunity for improvement exists, in relation to s. 9(1)(d), to improve the emergency chlorine disinfection system control measure in place to provide an immediate alert if performance is suboptimal i.e., chlorine dosing is low or high. The current situation may pose a drinking water quality safety risk, in the event chlorine under/over-dosing occurred, and the drinking water supplied may - (a) not have received adequate disinfection; or (b) contain unacceptably high chlorine. The appropriate action is to equip the SCADA system with a means to determine the chlorine dose rate and an alarm feature to immediately notify of suboptimal performance and set in motion the required corrective action(s).	Due to the technical aspects of the emergency chlorine system, dosing is based on flow. MHAR will seek advice and investigate options to equipe SCADA will an alarm feature given the highly variable flow rates experienced within the resort, along with the emergency use only aspect of the chlorine dosing system.	OPEN
2021-2022 OFI - 5	An opportunity for improvement exists, in relation to s. 9(1)(d), to complete the identification of the existing backflow prevention devices within the MHAR drinking water reticulation (auditing of premises) and establish a register to monitor inspection and compliance obligations.	MHAR to commence preliminary investigations to identify existing backflow prevention devices on premises at Mt Hotham.	OPEN
2021-2022 OFI - 6	An opportunity for improvement exists, in relation to r. 8(1)(b), to document in the MHAR Stakeholder Communications Plan procedures for consultation with other water agencies in relation to matters relevant to the hazards and risk to quality of the water supplied.	MHAR uses the “Stakeholder Communications Plan” to inform stakeholders of any drinking water quality issues that may arise. MHAR has recently become a member of Water Services Association of Australia (Victorian Water Quality Managers Network Group) on 11 Nov 2022. This gives MHAR the ability to communicate with other water agencies and consult on drinking water quality issues across a broad range of topics, should additional advice or technical information be required regarding drinking water quality.	CLOSED

2021-2022 OFI - 7	An opportunity for improvement exists, in relation to r. 8(1)(d)(v), to implement a process to ensure that the samples collected within the water sampling locality are not collected from the same sample collection point on two consecutive occasions.	Immediately following drinking water audit, the schedule was updated to ensure that samples are not taken from the same sample collection point on consecutive occasions.	CLOSED
2021-2022 OFI - 8	An opportunity for improvement exists, in relation to r. 8(1)(g), to verify the effectiveness of the chlorine disinfection process to achieve a chlorine Ct of > 15mg.min/L (at the first customer tap supplied) to meet the pathogen reduction requirements for the category 1 source water treated i.e., a LRV for bacteria of 4 (WSAA, 2015).	MHAR proposes to conduct further ongoing investigation program, to sample, test, and monitor free chlorine residuals and liaise with external consultants, to verify free chlorine Ct values at consumer taps that are closest to the emergency chlorination system. The data collected will assist with the development of practical methods to ensure pathogen reduction requirements for category 1 source water, log reduction values.	OPEN
2021-2022 OFI - 9	An opportunity for improvement exists, in relation to r. 8(1)(i)(i – iii), to identify and document all critical control points and limits, plus the associated corrective action to be taken in the event a critical limit is exceeded into CCP Plans for inclusion in the DWSMP.	CCP Charts for critical control points 1, 2, 3 & 4, the 200-micron filter, turbidity meter, UV#2 reactor and the emergency chlorine dosing system, have now been added to the draft DWSMP.	CLOSED
2021-2022 OFI - 10	It was observed in the raw water pump house that key components of the drinking water supply system were not labelled e.g., pipework, the 2mm and 200-micron mesh filters, and the turbidity meter. The Good Practice Guide to the Operation of Drinking Water Supply Systems for the Management of Microbial Risk pg. 14 (Water Research Australia, second edition, 2020) provides guidance regarding drinking water supply system infrastructure labelling.	Following the drinking water audit, MHAR drinking water personnel have commenced labelling the components in the pump house as per the observation. It is anticipated that this work will be completed at the conclusion of the 2023-24 summer building works period	CLOSED
2021-2022 OFI - 11	It was observed the Potable Water Supply System Critical Control Point Plan would benefit from some additional details, such as, the raw water weir sample points, the location for treatment plant performance monitoring i.e., UVI meter and clearly indicating Critical Control Points (CCP) within the system.	MHAR has engaged our external consultant to update the CCP plan, to include the additional details as per the observation.	OPEN
2021-2022 OFI - 12	It was observed the MHAR Emergency Management procedures does not address a Do Not Drink Advisory. The drafting of a Do Not Drink Advisory will aid preparedness should a situation occur that warrants this type of communication.	MHAR has drafted a “Do Not Drink” notice, which is able to be distributed to consumers via the Stakeholder Communications Plan.	CLOSED

3.15 Undertakings under section 30 of the Act

MHAR does not have any undertakings in place with the Department of Health

3.16 Variations, Exemptions and Regulated water

MHAR does not have any variation to aesthetic standards of drinking water.

MHAR does not have any exemptions from water quality standards.

MHAR does not supply regulated water not intended for drinking.

3.17 Further Information

Section 23 of the *Safe Drinking Water Act* 2003 requires that MHAR make available for inspection by the public the results of any water quality monitoring program that is conducted on any drinking water supplied by MHAR. Customers and members of the public may access drinking water quality data by contacting MHAR on the details below.

Mt Hotham Alpine Resort
PO Box 188, Bright VIC 3741
Ph: (03) 5759 3550
Email : info@mthotham.com.au

4. Mt Buller & Mt Stirling Alpine Resort

4.1 Overview

Alpine Resorts Victoria trading as Mt Buller & Mt Stirling Alpine Resorts (MBMSAR) is focused on 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 Water Quality Annual Report Guidance. This 2022-23 Drinking Water Quality Annual Report has been prepared in accordance with those requirements and provides information on the quality of drinking water provided by MBMSAR. The report is provided to the Secretary to the Department of Health and is available to the public via www.rmb/mtbuller.com.au.

ARV 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 MBMSAR (via ARV) 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. During the snow season, there is a residential population of approximately 1,600 plus approximately 400,000 visitors. Visitation fluctuates daily, typically peaking at 17,000 on weekends in July and August and the term 2 school holidays.

In contrast, the permanent population during the green season is approximately 40-50 people. A further 100 - 150 people work on the mountain during summer, including RMB and lift company staff, some accommodation and food & beverage providers, plus builders and construction workers. Events and activities are staged to drive visitation, generating approximately 50,000 visitors during the green season.

MBMSAR has licenses to draw up to 700ML p.a. (665 ML at Boggy Creek, 30 ML at Howqua, 3 ML at Mirimbah and 2 ML at Telephone Box Junction at Mt Stirling). Water for the Mt Buller Village comes from 3 sources - Boggy Creek, the ‘Headwaters’ and the ‘Catchment Weirs’.

Mt Stirling Resort has a common boundary with the Mt Buller Resort (the Delatite River), and Mirimbah is the entrance point for both. Mt Stirling has no permanent population or accommodation. It has a small building used by ARV 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 December to February period when a significant number of visitors pass through the resort to access Craig’s Hut. Camping within the resort is common.

Throughout 2022 MBMSAR were in discussion with Goulburn Valley Water (GVW) regarding GVW running water and sewer operations on behalf of MBMSAR. Historically MBMSAR was exposed due to water and sewer staffing allocations and felt it had limited resources and expertise in both fields. GVW has responsibility for completing all water and sewer operations at Sawmill Settlement which is 3km from Resort entry at Mirimbah. In October of 2022 both MBMSAR in-house operators took on new opportunities elsewhere expediating the process of appointing GVW to operate all water and sewer operations across the resorts. This has allowed for greater resourcing with up to 10 operators on the roster at any time. It has allowed ARV to use GVW’s expertise in water operations, often working in with their water quality specialist and IT team. There is currently a medium-term agreement in place between the two parties which runs until November 2024 with a view to signing a long-term agreement for up to 10 years.

4.2 Water supply systems

MBMSAR 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.

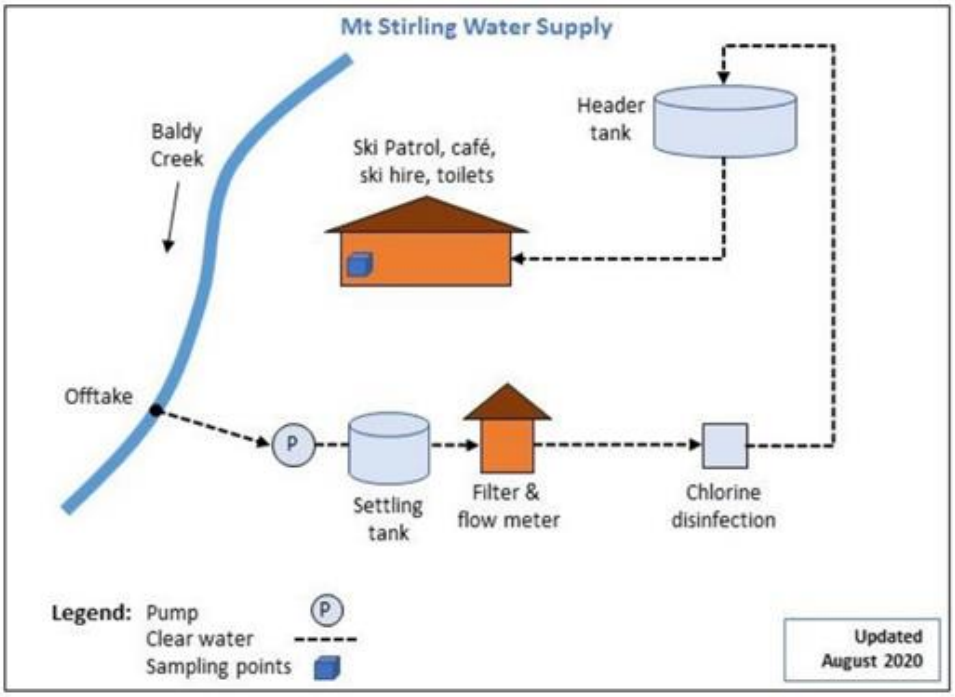


Figure 4.1: Mt Stirling Water Supply

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 north side of the Delatite River. Recently a low voltage chlorine analyser has been installed at the header tank which is viewed via SCADA and alarmed if chlorine levels drop below target range. This alarm is via a SMS message to GVW operators and their control centre.

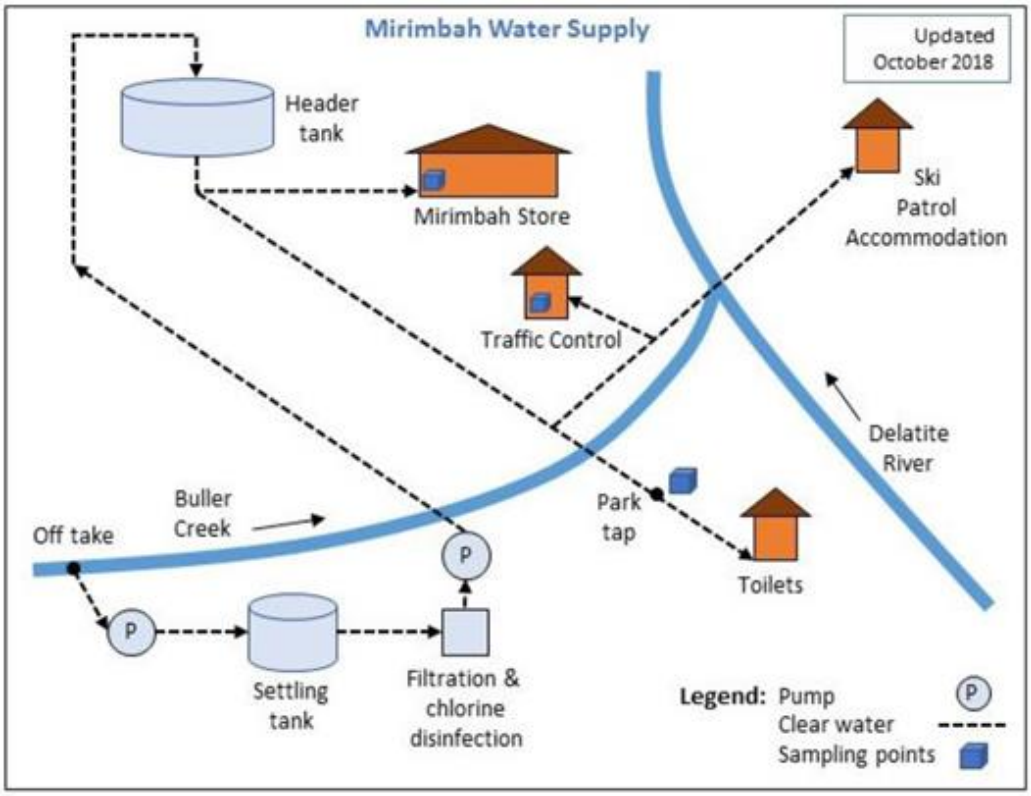


Figure 4.2: Mirimbah Water Supply

Mt Buller

Mt Buller's main source of water is the Boggy Creek catchment, which is above 1,250m and usually covered in snow during the snow season (early June to late September). At these times the water is either snowmelt or groundwater. During the green season (October to May), most of the 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. There are two small gullies within the catchment that have small weirs used to extract water. This Water is pumped from Boggy Creek to the 100ML Boggy Creek Reservoir to supply drinking water year-round.

There is a 100m elevation difference across the village. To maintain the maximum water pressure below 1,000KPa, there are two reticulations (Low Level and High Level) fed from water storages at different elevations.

Low Level reticulation

In the snow season source water was drawn from Boggy Creek and pumped to an open holding tank. Source water from the catchment weirs was gravity fed into the same tank. This water was then pumped into the open Burnt Hut Reservoir. In the green season water from Boggy Creek Reservoir was used to supply Burnt Hut Reservoir. Burnt Hut Reservoir served 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.

High Level reticulation

Water was pumped from Burnt Hut Reservoir to an underground concrete tank known as Baldy Tank. This then feed the High-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, public toilet and to a restaurant in the ski area called Kofler's Hutte. The workshops are served by a rising main, while Kofler Hutte's is served through a rising main to two storage tanks and then gravity fed to the premises.

Water Quality

The source water was of good quality and monitored via a water sampling program. Retention in the Burnt Hut Reservoir and Baldy Tank allowed suspended solids to settle before use. Online meters and loggers were used to monitor turbidity prior to treatment. Higher turbidity can occasionally occur in source water during wet weather and result in a slight water discoloration of drinking water. The UV and chlorine systems were serviced annually and monitored via a telemetry-based system. A cyclic maintenance program included emptying and removing silt from Burnt Hut Reservoir and reticulation system each summer and flushing the reticulation system at least twice a year to remove film build-ups. During 2022/23 the following maintenance and upgrades were completed:

- servicing of all pumps, turbidity meters and testing equipment.
- Thermal imaging of boggy 1 & 2 pumps.
- Major servicing of the high-level and low-level UV disinfection units as per servicing agreement with Aqua-manage.
- Professional dive services completed cleaning of boggy 1 and Baldy tanks.
- SCADA radio frequency survey completed via GVW IT staff with proposed upgrades to be completed Q4 2023.

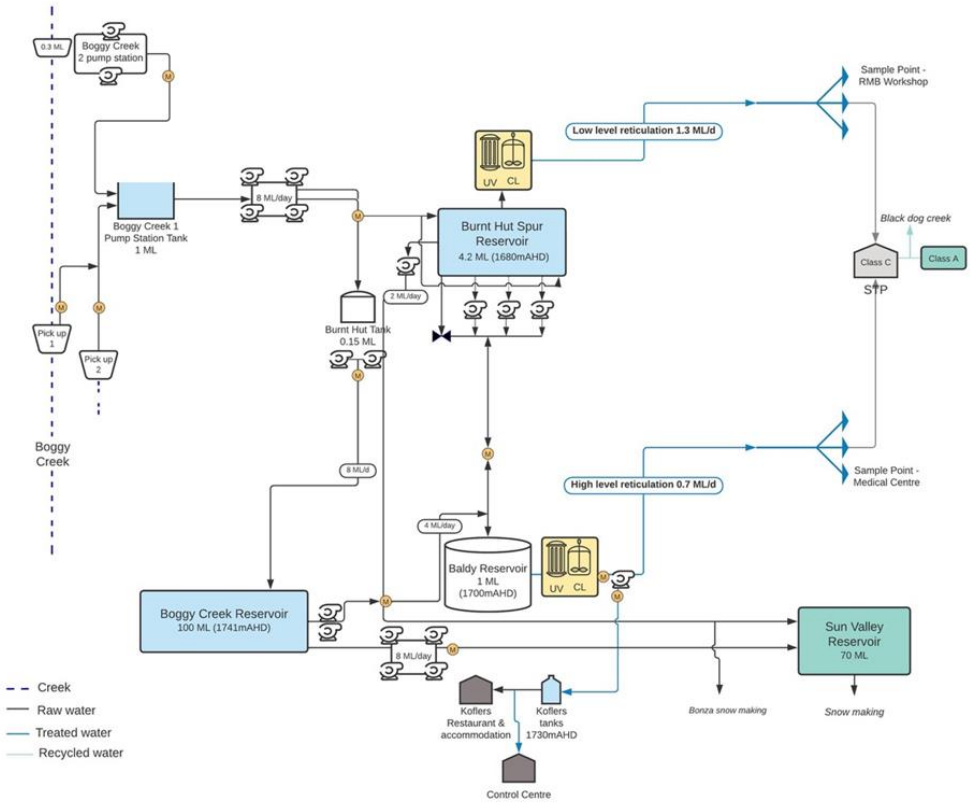


Figure 4.3: Boggy Creek Reservoir

Table 4.1 Summary of Water Supply Systems

	Mirimbah	Mt Buller		Mt Stirling
		Low Level	High Level	
Source water	Buller Creek	Boggy Creek	Boggy Creek	Baldy Creek
Storage raw water	22.8KL plastic tank	100ML Lined open storage		5KL plastic tank
		4.2ML lined open storage	1ML concrete tank	
Treatment plant	Mirimbah	Burnt Hut	Baldy	Telephone Box Junction
Population supplied	No permanent ~5 seasonal staff	Up to 5,000 in snow season	Up to 3,000 in snow season	No permanent, no accom
Treatment process	Cartridge filter & hypochlorite	UV & hypochlorite	UV & hypochlorite	Cartridge filter, activated carbon filter, hypochlorite
Added substances	Sodium hypochlorite	Sodium hypochlorite	Sodium hypochlorite	Sodium hypochlorite

4.3 Drinking water treatment process

Table 4.2 Drinking Water Treatment Processes

Treatment processes	Mirimbah	Mt Buller		Mt Stirling
		Low Level	High Level	
Coagulation & flocculation				
Treatment process				
Clarification				
Sedimentation or clarification				
Dissolved air flocculation				
Filtration				
Granular media filter				
Membrane				
Cartridge filter	✓			✓
Disinfection				
Chlorine gas				
Sodium hypochlorite	✓	✓	✓	✓
Chlorine dioxide				
Ultraviolet		✓	✓	
Ozone				
Other				
Activated carbon				✓
Ion exchange				
Reverse ozmosis				
Sludge handling (mechanical with chemicals)				

4.4 Emergency Incident & Event Management

E. coli Detection

On November 9 2022, ARV Mt Buller Mt Stirling was notified by ALS of an *E.coli* detection in the Mt Stirling's reticulation system at Telephone Box Junction. ARV immediately contacted the Department of Health and a Section 22 was submitted. The identification and rectification action to the incident were.

- Resampling took place to determine the status of drinking water.
- Inspection of the header tank and plant performance, Both were operating as normal.
- It was determined that the contractor taking samples had been trained by ARV staff, however, was inexperienced and was not given copy of the standard operating procedure.
- After an investigation by Mt Buller Mt Stirling ARV it was concluded that the E. coli event was a false positive due to the plant operating as normal and the free chlorine residuals present at the sample point and header tank were significant enough that *E.coli* could not exist in that environment.
- ARV worked with the contractor who was sampling to ensure all possible steps were taken to avoid false positive detections and that standard operating procedures are followed.

E. coli Detection

On June 14 2023, ARV Mt Buller Mt Stirling was notified by ALS laboratory that a sample taken on 13 June 2023 at Mt Buller High-level had a preliminary E. coli detection of 1 org/100mL. The Department of Health was notified on 14 June within required time frame of 1 hour and a section 22 was submitted. The identification and rectification actions to the incident were

- Sample was collected at the Medical Centre for lab analysis by ALS Wangaratta
- Inspections were completed at the high-level treatment plant, Baldy tank and high-level reticulation sample point. GVW staff did not find any evidence of ingress or any other form of contamination.
- All treatment process and plant performance were within the expected target ranges for this period.
- Sampled results received on 15 June 2023 returned with no detection of E. coli and The Department of Health was notified.
- After an investigation by Mt Buller ARV it was concluded that the E. coli event was a false positive due to the plant operating as normal and the free chlorine residuals present at the sample point were significant enough that E.coli could not exist in that environment.
- ARV worked with the sampling team to ensure all possible steps were taken to avoid false positive detections and that standard operating procedures are followed.

E. coli Detection

On June 28 2023, ARV Mt Buller Mt Stirling was notified by ALS laboratory that a sample taken on 27 June 2023 at Mirimbah had a preliminary E. coli detection of 1 org/100mL. The Department of Health was notified on 28 June within the required time frame of 1 hour and a section 22 and 18 were submitted. The identification and rectification actions to the incident were:

Identification

- Samples collected at three sample points as per Mirimbah schematic for lab analysis and field chlorine test conducted with a result of 0.1mg/L of residual free chlorine.
- Three samples returned E. coli in each location from sampling.
- Inspection of catchment and water storage tanks concluded that there was a point of ingress identified at the header tank inspection lid. A faulty chlorine probe resulted in ineffective chlorine dosing. Due to water age and dissipation of chlorine there was no buffer preventing contamination.
- A "Do Not Drink Tap Water" advisory was issued for the Mirimbah locality. Each occupied site was visited and informed of the advisory Mirimbah store and Traffic control/resort entry. Signage was installed Stating "Do Not Drink Tap Water" at all locations Mirimbah store, Traffic control/resort entry, ski patrol accommodation, public toilets and the park tap. Bottled water was supplied to all occupied sites.

Rectification

- A reinstatement plan was submitted to the Department of Health.
- The tank was drained (22.8KL plastic tank) and inspected with no obvious signs of contamination. A New lockable screw cap installed. Refilled header tank with batch of new treated water. Replaced filter cartridge as a precaution even though the differential pressure was within operational parameters.
- Flushed reticulation system two days in a row to extremities to displace contaminated water. Flushing occurred until a residual of 0.5mg/L was recorded at extremities.
- Faulty chlorine probe was replaced. A chlorine analyser was installed at the header tank and connected to Scada to ensure there was a sufficient barrier against contamination and water age was within the expected range.
- Two days of clear samples were obtained with no signs of E. coli
- Drinking water advisory was lifted and opportunities for improvement identified and actioned.
- No customer complaints or illness were reported.
- In depth investigations were undertaken according to *Appendix 1: guidelines for the investigation and reporting of E. coli detections.* Findings were that the cause was most likely due to the ingress at the inspection point on the header tank and free chlorine levels below desired target range.

4.5 Drinking Water Quality Standards

Drinking water quality was monitored against regulatory standards, including undertaking weekly samples for *Escherichia coli (E. coli)* and turbidity. Monthly samples were collected and tested for disinfection by-products. Results were 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. All samples were undertaken in accordance with the prescribed schedule.

Table 4.3 *Escherichia coli* sampling results

Escherichia coli	**Mirimbah**	**Mt Buller**		**Mt Stirling**
		Low Level	**High Level**	
Quality standard (no E.coli per 100ml of drinking water except any false positive samples) – Safe Drinking Water Regulations Schedule 2	0	0	0	0
Sampling frequency	Weekly	Weekly	Weekly	Weekly
No. of samples	52	52	52	52
Max. detected (org/100ml)	0	0	0	0
No. of samples where standard not met (s.18)	0	0	0	0
Samples with no *E.coli*	98%	100%	98%	98%
Max. values: 2020/21	0	0	0	12
2021/22	0	0	0	0
2022/23	1	0	1	1

E. coli results over the last three years were good other than the one incident of *E. coli* detection at Mt Stirling in January 2023 and one incident at Mirimbah in June 2023. The incident at Mt Buller was a false positive.

Table 4.4 Trihalomethanes sampling results

Trihalomethanes	Mirimbah	Mt Buller		Mt Stirling
		Low Level	High Level	
Quality standard (mg/L) - Safe Drinking Water Regulations Schedule 2	0.25	0.25	0.25	0.25
Sampling frequency	Monthly	Monthly	Monthly	Monthly
No. of samples	12	12	12	12
Max. (mg/L)	0.23	0.04	0.054	0.085
Average (mg/L)	0.065	0.02	0.033	0.044
No. of samples where standard not met (s.18)	0	0	0	0
Max. values: 2020/21	0.044	0.1	0.075	0.11
2021/22	0.056	0.1	0.046	0.059
2022/23	0.23	0.04	0.054	0.085

All sampling localities met the THM standard for the 2022/23 reporting period.

Table 4.5 Turbidity sampling results

Turbidity	Mirimbah	Mt Buller		Mt Stirling
		Low Level	High Level	
Quality standard (95th percentile of results for samples over 12 months) – Safe Drinking Water Regulations Schedule 2	<5.0	<5.0	<5.0	<5.0
Sampling frequency	Weekly	Weekly	Weekly	Weekly
No. of samples	52	52	52	52
Max. turbidity in a sample (NTU)	4.40	2.38	2.3	1.3
Max. 95th percentile of turbidity in 12 months	0.3	1.40	1.49	0.45
No. 95th percentile of results above standard (s.18)	0	0	0	0
Max. values: 2020/21	0.3	0.9	0.7	1.3
2021/22	0.3	1.9	1.9	0.5
2022/23	0.7	1.75	1.76	0.6

All sampling localities met the turbidity standard for the 2022/23 reporting period.

The locations of the water sources lead to very low sedimentation and movement of material into the catchment. Ongoing 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 activity. 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.

4.6 Other Water Quality Standards

Algae

Routine assessment of storages for the presence of BGA occurs with triggers to undertake more comprehensive sampling if needed. In the 2022/23 reporting period no incidents or evidence of potentially toxic or toxic BGA.

Ozone based disinfection by-product chemicals

Ozone disinfection is not used, so there is no monitoring of by-products.

Table 4.6 Chlorine based disinfection by-product chemicals

Chlorine Based disinfection	Mirimbah	Mt Buller		Mt Stirling
		Low Level	High Level	
Chloroacetic acid				
ADWG Health guideline value (mg/L)	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)	0	0	0	0
Max. values: 2020/21	<0.005	<0.005	<0.005	<0.005
2021/22	<0.005	<0.005	<0.005	<0.005
2022/23	<0.005	<0.005	<0.005	<0.005
Dichloroacetic acid				
ADWG Health guideline value (mg/L)	0.1	0.1	0.1	0.1
Sampling frequency	Monthly	Monthly	Monthly	Monthly
No. of samples	12	12	12	12
Maximum (mg/L)	0.06	0.020	0.031	0.052
Average (mg/L)	0.03	0.010	0.024	0.027
No. of samples where standard not met (s.18)	0	0	0	0
Max. values: 2020/21	0.02	0.03	0.03	0.07
2021/22	0.35	0.03	0.018	0.057
2022/23	0.06	0.020	0.031	0.052
Trichloroacetic acid				
ADWG Health guideline value (mg/L)	0.1	0.1	0.1	0.1
Sampling frequency	Monthly	Monthly	Monthly	Monthly
No. of samples	12	12	12	12
Maximum (mg/L)	0.090	0.020	0.022	0.10
Average (mg/L)	0.040	0.010	0.012	0.040
No. of samples where standard not met (s.18)	0	0	0	0
Max. values: 2020/21	0.05	0.10	0.03	0.14
2021/22	0.06	0.043	0.046	0.081
2022/23	0.090	0.020	0.022	0.10

All sampling met the associated standards for the 2022/23 reporting period.

4.7 Drinking Water Quality Standard Not Met and Actions Taken

Refer to section 5. Emergency Incident and Event Management.

4.8 Aesthetic Characteristics

No taste or odour issues were identified or reported during the reporting period. Most pH results were within the target range of 6.5-8.5. Lower pH values are attributed to the low alkalinity in the raw water and the higher water usage during peak snow season. Higher pH values are attributed to the effect that Ductile Iron Cement Lined pipes and cement lined storage has on pH during low usage periods. If the pH moves out of ADWG for aesthetic value specifications, operators may flush the system until it returns to operational target specifications.

4.9 Water quality complaints 2022/23

There were no complaints in this reporting period.

Table 4.7 Water quality complaints summary

Complaints	Mirimbah 2022/23	Mt Buller 2022/23	Mt Stirling 2022/23
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
Total	0	0	0

4.10 Risk management plan audit results

ARV's Safe Drinking Water Risk Management Plan was audited during the reporting period. Certificate attached (attachment 2). Progress on opportunities for improvements identified in the past 5 years are outlined below.

Table 4.8 2017/18 Risk Management Plan Audit OFIs

Opportunities for Improvement	Actions	Status
Consider training, including, for the new Board. Ensure any incoming Directors are aware of responsibilities including possible increase in water requirements. Suggest integrating with a mini review of the infrastructure plan including: • Snow making. • Clarifying and extending the value of supplier contracts. For example, CTech could also conduct a yearly performance review of chemical key performance indicators. • Considering some of the maintenance team assisting the water maintenance team.	An induction program was provided to the Board in March 2018 including an overview and tour of snow making facilities and operations. A cross-training arrangement was implemented so that some of the Outdoor Operations team can support the Water team.	Completed
Suggest continuing to develop alarms systems and the core team to support this. Suggest also considering integrating with key suppliers, for example: • CTech could also discuss and integrate your alarms with their own alarm systems and protocols. • During your yearly overhaul of UV systems which could include training	SAFEgroup Automation implemented a new SCADA system which provides capacity for additional CCP's and includes an improved range of alarms.	Completed
It is very encouraging to note that the Mt Stirling chlorine-dosing system is to be upgraded shortly following three higher trichloracetic acid test results. In addition, suggest considering a greater emphasis on critical control points for: • Chlorine dosing (CTech also make suggestions on optimising chlorine dosing when there are low water flows). • Turbidity - further develop procedures and ensure sufficient water storage when water intake is restricted following a rain event.	The treatment facility was redeveloped in 2019.	Completed

Table 4.9 2019/20 Risk Management Plan Audit OFIs

Opportunities for Improvement	Actions	Status
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.	A cross-training arrangement was implemented so that the Outdoor Operations team can support the Water team.	Completed
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.	Digital radio upgrade for Boggy-1/Dam and Burn Hut to 4G network was completed.	Completed
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.'	Additional alarms were added to the SOPs during a review and update in February 2020.	Completed
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.	UV was programmed to ramp up and down the power automatically based on target UV intensity set point	Completed
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. Suggest for Mt. Stirling to also review additional options, for example, more advanced chlorination. 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 was incorporated in March 2021. Mt Stirling's filtration and chlorine installation was completed. The Mirimbah SCADA and control upgrade was completed in August 2020	Completed
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. 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. 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 as part of upgrading the plant for treating water from the Boggy Creek Reservoir. Project is in planning and design phase with indicative completion May 2024.	In progress.
Suggest also consider security camera upgrade integrated with installing additional security signs.	Security and signage review was conducted in 2021 and additional signs installed.	Completed

Table 4.10 2021/22 Risk Management Plan Audit OFIs

Opportunities for Improvement	Actions	Status
A risk review was undertaken in November 2021. RMP section6.1 Assessment Table 7 shows the log reduction shortfalls.	Review the gaps identified in the RMP. Completed and updated via Dan Deere (Water futures)	Completed
Risks are identified and appropriate control measures are in place. Planning is underway for a catchment sanitary survey in 2023.	Catchment assessment has been completed via Dan Deere (Water futures) and RMP updated. No shortfalls in the treatment process identified.	Completed
MBMS and GVW Staff are motivated and looking for new ideas to minimise the risks to the water supply.	Look for new ideas to minimize the risks to the water supply. Initial investigative stages of CCTV camera install at various locations.	In progress
Schematic water systems are provided in the RMP.	Improve schematic by digitizing and including all key elements of supply system in RMP	Completed
Sample locations are identified as per the regulatory requirements. The sampling is undertaken and analysed as per the RMP.	Undertake trend analysis for key WQ parameters to understand the system behaviour over time to minimise risks. ARV completes yearly spreadsheets with results and trends from sampling program.	Completed
Specific Parameters meet the regulatory requirements.	A few additional parameters could benefit operational monitoring. Currently reviewing annual sampling program.	In progress
The Buller system only has UV and chlorine disinfection. Stirling and Mirimbah Chlorine disinfection.	During long-term planning consider additional barriers. Currently in design & construct phase of a treatment plant upgrade for Mt Buller. Additional barriers for Mirimbah & Stirling being assessed in conjunction with GVW.	In progress
Source selection is critical for all three water systems. Primary disinfection is using	During long term planning consider additional barriers.	In Progress

chlorine and additional treatment with UV for Buller.	• Capital works planning currently underway to include additional barriers at each WTP.	
In the event of a major water ring main failure, there is an opportunity for water to backflow into the network. All new developments are required to install backflow prevention devices.	Consider additional safeguards to alarm out in the event of negative pressure in the network.	In progress. Initial discussions with GVW regarding pressure sensors installed in the high and low level retic systems connected to SCADA.

4.11 Undertakings

MBMSAR has no undertakings in place with the Department of Health.

4.12 Regulated water

Regulated water is water that is not intended for drinking, but which could reasonably be mistaken as being drinking water. MBMSAR did not supply any regulated water during the 2022/23 reporting period.

4.13 Further information

Section 23 of the Safe Drinking Water Act 2003 requires that ARV 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 ARV. Current and previous annual reports are also available at https://www.rmb.mtbuller.com.au /publications.

5. Mt Baw Baw & Lake Mountain Alpine Resort

SECTION A - LAKE MOUNTAIN ALPINE RESORT

5.1 Overview

Lake Mountain Alpine Resort (LMAR) is located approximately 120km northeast of Melbourne, the closest alpine resort to Melbourne, and the premier family snow play destination in Victoria. Located adjacent to the Yarra Ranges National Park, the resort covers an area of 465 hectares with the summit elevation at 1,433m. The Resort comprises of toboggan slopes, cross-country ski trails, the visitor centre and administration building, all situated at an elevation of approximately 1,400m. Lake Mountain Alpine Resort is one of Victoria's premier cross-country alpine resorts, offering 37km of groomed trails providing access to over 2,400 hectares of skiable terrain in the National Park. During the green season Lake Mountain is an event venue, hosts guided walking tours, mountain biking, road cycling and provides several nature-based adventure activities.

Lake Mountain is located at the edge of the Yarra Valley, one of Victoria's key gourmet produce and wine regions. The resort is close to and has a strong relationship with the town of Marysville, 22 kilometres away. Once a prospering tourism and conference hub, with a strong day visitation market, Marysville and the surrounding region continue to rebuild the tourism offer after the devastating 'Black Saturday' bushfires of early February 2009 and have seen growing overnight stay visits.

5.2 Water supply

Lake Mountain Alpine Resort is a Regulated Water System as defined under the *Safe Drinking Water Act 2003* ('the Act'). The storage and supply of water to the Resort is untreated as declared and gazetted by the Minister for Health on the 23rd of October 2005. 'Regulated Water' is defined in Section 6 of the Act as, water that is not intended for drinking but could be reasonably mistaken as drinking water. Lake Mountain Alpine Resort is the sole water (regulated) supplier to the following facilities.

- Day Visitor Centre which includes;
  - Public space
  - Public amenities
  - Food outlet
  - Ski patrol/ first aid
  - Resort ticketing outlet
  - Retail outlet
- Resort Administration Centre which includes;
  - Snow sports centre
  - Rental department
  - Public space
  - Administrative offices
- Workshop shed
- Snowy Hill amenities building
- Snow making system

As a regulated water supplier Lake Mountain Alpine Resort must:

- Prepare a risk management plan for the regulated water.

- Ensure that the risk management plan contains the matters detailed in Regulation 6 of the *Safe Drinking Water Regulations* (except those that specifically relate to drinking water only).
- Have the Risk Management Plan audited, when required, by the Secretary to the Department of Health by an approved auditor.
- Take all reasonable steps to ensure that the intended recipients of the water are made aware of the nature of the water and of the health risks that may arise from the use of the water.
- Include a summary of their management activities for regulated water in their annual report.

Actions taken as the responsible water supplier during this reporting period are referred to in the section 4 (Risk Management).

5.3 Water source, storage, and distribution

Gerraty's
Gerraty's is the resort's village centre. Water is sourced from the Upper Taggerty River. This small stream is fed by the bog and heath catchment area of Echo Flat. This plateau is within the Yarra Ranges National Park and considered a pristine environment, the only possible human contact is from some of the cross-country ski trail network that borders the catchment area, or from people camping where there are no toilets, which is limited.

Source water, Echo Flat


The main water supply system for Gerraty's consists of a small concrete weir directing water from the Taggerty River via a series of 50mm poly pipes, under a gravity/syphons process, to 3 enclosed concrete tanks. The combined storage capacity of these tanks is 800kL. The storage tanks supply water to resort's facilities via a 100mm ductile iron pipe.

Snowy Hill
Water is sourced from the storage and distribution system at Gerraty's. The delivery line works on gravity/syphons process via 50mm poly line that supplies the Snowy Hill amenities.

Arnold Gap
Water is sourced from a small tributary and stored in 1000L poly tank. The supply and delivery lines for systems work on gravity/syphons process via 50mm polythene lines which in turn supplies water to the amenities building located at Arnold Gap.

Cascades

Water is sourced from a small tributary and stored in a 2270L poly tank. The supply and delivery lines for systems work on gravity/syphons process via 50mm polythene lines which in turn supplies water to the amenities building located at Cascades. In addition, a water tank was installed in 2020, which is based on rainwater collection and services the staff toilet at the ticket box.

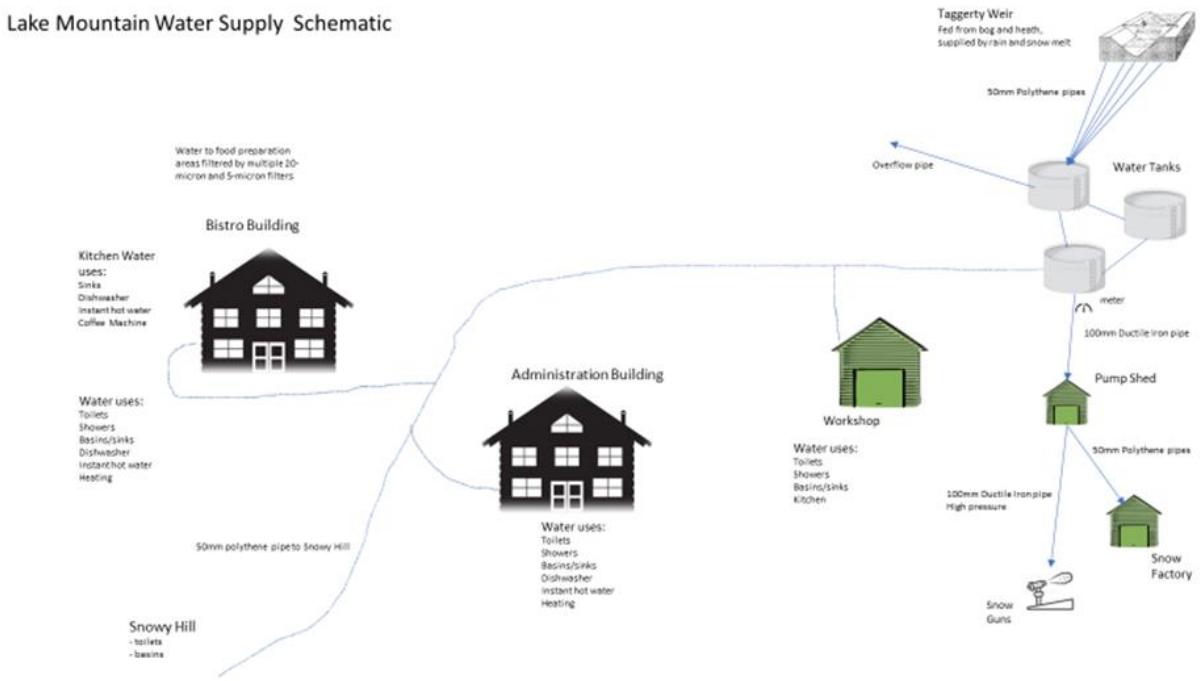


Figure A1: Lake Mountain Alpine Resort water supply schematic drawing

5.4 Quality Management Systems

There is no treatment applied to the water supply at Lake Mountain. Resort management is taking steps to minimise the possibility of potential health risks by raising public awareness through the placement of "Do Not Drink" signage above all resort water outlets, advising resort visitors that the water is not treated, nor is it suitable for consumption. Water that feeds into the food preparation outlets is filtered with both multiple 20-micron and 5-micron cartridge units. Testing occurs offsite by ALS Water on a fortnightly basis to analyse turbidity, *E.coli*, Coliforms and Plate Counts.

As part of the management of the water supply system water quality monitoring is undertaken. Catchment and associated water delivery and storage infrastructure inspections are conducted to minimise any potential for supply failure and contaminants which may affect water quality and impact the water supply system. The management of the storage and water diversion infrastructure includes the purging of the reticulation system coupled with the cleaning of the storage tanks, which is undertaken on a twice-yearly basis.

5.5 Regulated Water Risk Management Activities

The management activities that have been implemented in relation to regulated water supply, in particular those that pertain to Section 25 of the *Safe Drinking Water Act 2003*, warning to be given if regulated water supplied are described as follows:

- A blanket signage program for all water outlets on the resort has been completed and maintenance schedule that is monitored through the resort Water Supply Risk Management Plan. All water outlets have been signed warning visitors to Lake Mountain that water is untreated and of the health risks that may arise from its use.

Figure A2: Signage displayed at all water outlets

- User groups of the mountain through public forums and stakeholder meetings are advised of the issues pertaining to the non-treatment of the resorts water supply and of the health risks that may arise from its use.
- All managers and staff working within the commercial operations on the resort are briefed on issues pertaining to the non-treatment of the resorts water supply and the health risks that may arise from its use.
- As a part of the resort staff induction information sessions, the non-treatment and health risks that may arise from the use of water on the resort are covered both verbally and as inclusion in the resort employee handbook, which all employees receive prior to commencement of employment.
- To minimise risk to employees the resort management have installed water coolers and supply potable water for consumption.

5.6 Future of Water Supply

An Integrated Water Management Plan will be developed to guide the future of water supply management at Lake Mountain Alpine Resort. This plan will evaluate all aspects of the water cycle and examine innovative management solutions for the Resort as it develops.

As Lake Mountain is still in the process of appointing a consultant to commence work on an Integrated Water Management Plan (IWMP), the OFIs arising from the June 2020 report are still in progress.

SECTION B - MT BAW BAW ALPINE RESORT

5.7 Overview

The Resort is located on the south-west face of the Baw Baw Plateau, two and a half hours' drive east of the Melbourne CBD. Mt Baw Baw has a summit elevation of 1,565 metres and gently sloping terrain with gradients of 15% to 25%. It consists of and is surrounded by a rich variety of diverse alpine and sub-alpine native vegetation. The resort is surrounded by Crown land with the Baw Baw National Park on the northern and eastern boundaries and Tanjil State Forest towards the western and southern sides. Whilst the resort covers 355 hectares, just 37 hectares have been developed. Developed land includes groomed ski runs, 7 ski lifts, a seasonal terrain park, toboggan runs and 10 kilometres of groomed cross-country ski trails. The village has 43 surveyed sites, 34 of which are developed, and land occupied by site holders is under leasehold or licence.

The resort at peak operation during the white season offers 7 surface lifts, with a mix of terrain of for beginners, intermediate skiers and more advanced skiing, 2 toboggan parks, 2 magic carpets, a beginners area, a small terrain park and is home to 3 alpine dingoes.

During the green season, the resort is home to mountain biking trails, offers guided walking tours, road cycling (including part of the Seven Peaks) and is an access point for hikes into the surrounding Baw Baw National Park.

Parking is available for up to 700 cars (approx. 2,600 visitors) and at least 20 buses at any time. With occupancy highest during the white season, the resort offers almost 578 accommodation beds, with a variety of styles covering most budgets.

5.8 Characterisation of the system

Alpine Resorts Victoria (trading as Mt Baw Baw Alpine Resort - MMBAR) is classified a Drinking Water Supplier as defined under the Safe Drinking Water Act 2003.

As a water supplier, MBBAR must:

- Prepare, implement, review and revise a risk management plan in relation to its supply of drinking water and regulated water.
- Prepare a report for the Secretary, in respect of each financial year, on the issues relative to the quality of drinking water.
- Monitor drinking water supply from catchment to tap (water sampling points).
- Ensure all drinking water supplied meets water quality standards.
- Notify the Secretary if non-complying water is supplied or is likely to be supplied.

5.9 Source of water

Dam Valley Catchment

The water used throughout the Resort is supplied by the 'Dam Valley' catchment, a protected valley slightly elevated above the village. Runoff in the catchment is collected by a minor tributary of the headwaters of the Tanjil River – Eastern Branch. The runoff, a mixture of rainfall and snowmelt, flows through sphagnum moss which provides a minor form of natural filtration for suspended particulate matter. A weir constructed in the stream below Dam Valley captures and directs water to a draw off pipe supplying 2 x 200,000 litre concrete storage tanks to service the village.

The catchment is heavily vegetated by shrubs and trees, with the exclusion of a single access trail through the north-western side of the catchment, the environment is in pristine condition. There is limited recreational access to the catchment area, primarily used by cross country skiers in winter and bushwalkers and mountain bikers in summer. Clear signage is located at both ends of the trail advising users of the importance of catchment preservation, to remain on track and prevent contamination.

Raw water sampling is conducted in the catchment area monthly to monitor the raw water quality including monitoring for parameters such as turbidity and organic chemicals. The catchment is inspected monthly. Visual inspections are conducted to assess the condition of management features (e.g. signage, access track, drainage boards and the weir). Catchment condition is assessed to identify any potential contaminants, signs of pollutants and any other reportable items (e.g. significant snow cover). These assessments allow for constant understanding of catchment health and assist to identify the source of potential raw water contamination.

Raw water storage

Raw water supply is contained within two 200,000 litre concrete storage tanks at the south western end of the catchment. Water is fed by gravity from the weir and connected by a 150mm ductile iron, concrete lined (DICL) pipe to the village treatment, distribution, and reticulation network. Overflow from the supply tanks, as untreated water, is discharged back into the headwaters of the Tanjil River – Eastern Branch before any treatment occurs. This overflow runs most of the time, indicating that the flow through the weir currently exceeds the village demand.

Regular weekly monitoring of raw water in the supply tanks is undertaken to understand any potential contamination which may be hindering quality. Results obtained from raw water quality sampling are utilised to assist with identification of potential issues prior to final treatment of water and supply to the village reticulation network.

Snow making water storage (back up supply)

Raw water for snow making is contained within two 200,000 litre concrete open storage tanks and one 1ML corrugated steel open storage tank located on Big Hill. Water is pumped from the ski bowl weir and Maltese Cross weir fed by Tanjil River – Eastern Branch. Filling of the tanks is a manual process of activating pump systems and is undertaken regularly during the white season for snow making production. During the green season, this supply is kept full as back up supply to the village pre-treatment.

Water quality monitoring is undertaken in the snow making storage tanks periodically throughout the green season, to provide an understanding of quality in the event it was required for supply to the village. Monitoring includes the analysis of critical parameters that is likely to have potential effect on the quality of drinking water.

5.10 Service area

Distribution System

The service area encompasses the entirety of the Baw Baw Village which can be seen in *figure B1.* Water is treated at the WTP (*figure B1*) into clear water storage tanks and distributed throughout the village under a pressurised system. The majority of the village reticulation is made from 100mm galvanised or DICL pipework. There are 4 scour valves within the reticulation system, and these are typically run on an ad-hoc basis to clear out accumulation of sediments within the network. Sluicing is conducted dependent on water quality or availability.

Figure B1: Mt Baw Baw water supply system overview

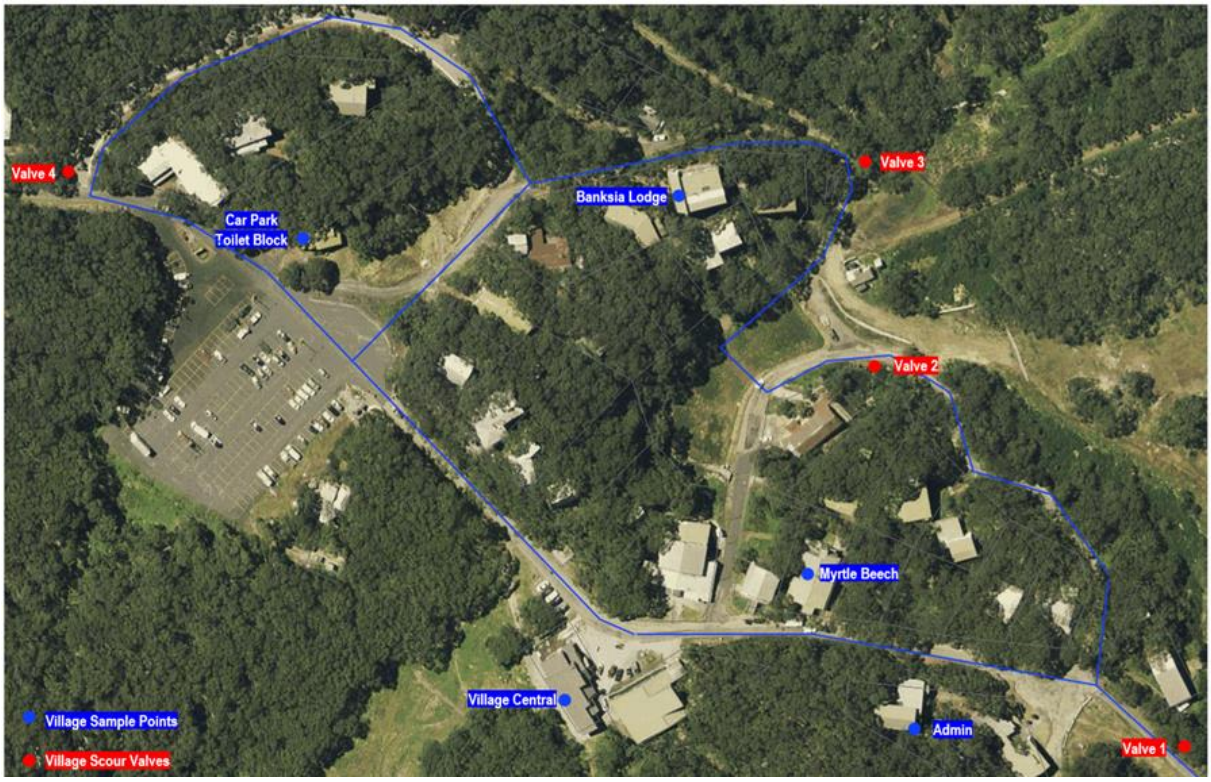


Figure B2: Mt Baw Baw water supply village network detail

5.11 Water Treatment and Quality Management Systems

Treatment processes

r.16(e)(i)

The Resort utilises a multibarrier approach to drinking water treatment which includes two methods of filtration, UV disinfection, hypo disinfection and pH correction, all within a containerised secure water treatment plant (WTP) installed in May 2022.

Prior to this the Resort utilised a multibarrier approach to drinking water treatment which included pre oxidation with chlorine dioxide and disinfection by UV and sodium hypochlorite.

Pre-May 2022

Chlorine Dioxide

Chlorine Dioxide (installed May 2021) is used as pre oxidising agent to enhance effectiveness of disinfection treatment systems and improve aesthetic properties. Chlorine Dioxide is generated onsite and dosed into two 23,000L holding tanks to reduce the volume of organic matter, before being treated as required via UV and Sodium Hypochlorite. As a byproduct of Chlorine Dioxide, Chlorite is monitored frequently to ensure compliance with health and aesthetic guidelines.

UV Treatment

The UV treatment plant consists of one Hanovia PMD200F Ultra Violet (UV) treatment system which acts as the resort's primary treatment barrier. The UV unit is an unvalidated system with dose calculated using flow rate, UVT (assumed static rate) and UV intensity. There are nil by-products to be monitored as a result of UV treatment.

Sodium Hypochlorite

A residual trim unit provides automated sodium hypochlorite dosing post UV treatment. Dose rates are set to a manual dose rate or flow pace dependent on current system demand. The residual trim unit acts as a secondary disinfection barrier in the resort's multiple barrier approach to water treatment. This unit provides the ability to control the level of dosing remotely and maintain a disinfection residual within the reticulation system. As a byproduct of sodium hypochlorite, trihalomethanes (THMs) are monitored frequently to ensure compliance with health and aesthetic guidelines.

Table B1: Drinking Water Treatment processes, added substances and byproducts monitored *r.16(e)(ii)*

Location	Treatment Process	Added Substances	Byproducts monitored
Drinking Water Treatment	Pre-oxidation	Chlorine Dioxide	Chlorite
	Ultra Violet (UV) Hanovia PMD200F	N/A	N/A
	Chlorination C-Tech Residual Trim Unit	Sodium Hypochlorite	THMs

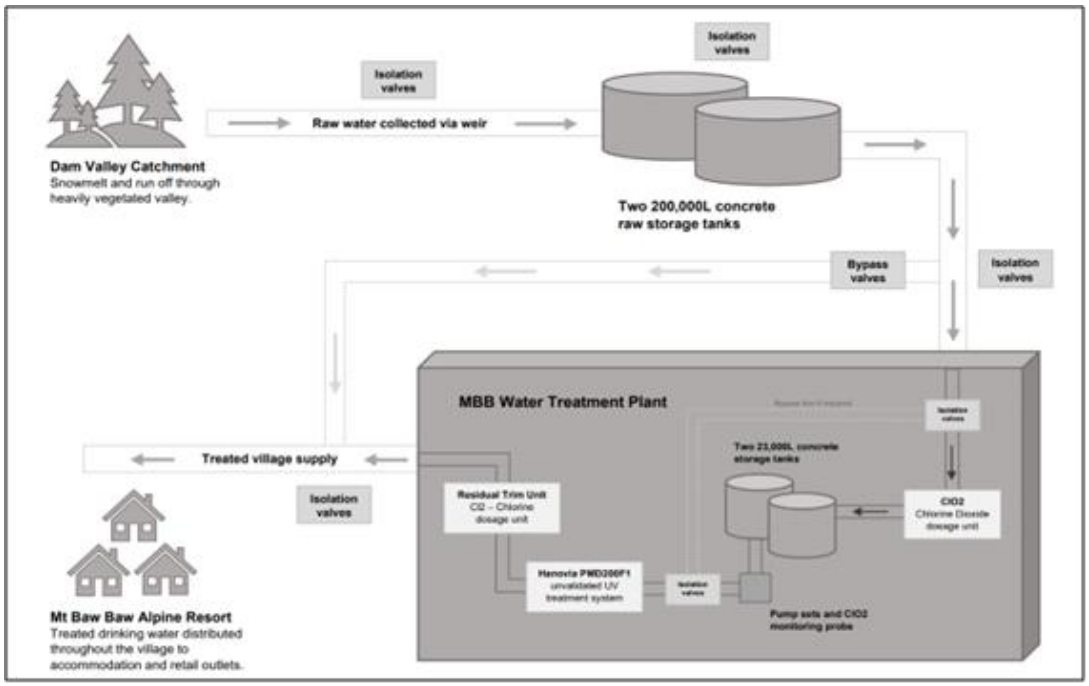


Figure B3: Mt Baw Baw water supply schematic

Post May 2022

Following an upgrade of the water supply, the potable water treatment plant process is now as follows:

- AFM media filtration – to remove the majority of coarse solids.
- GAC filtration (lead/lag configuration) to achieve organic removal.
- UV disinfection to disinfect water and final bacteria control.
- Sodium Hypochlorite dosing to maintain level of chlorine in treated water for further bacteria control.
- Caustic (Sodium Hydroxide) to maintain level of pH in treated drinking water.
- Recirculation system allows free chlorine concentration to be topped up continuously as required.
- Distribution pump to deliver water to the site.

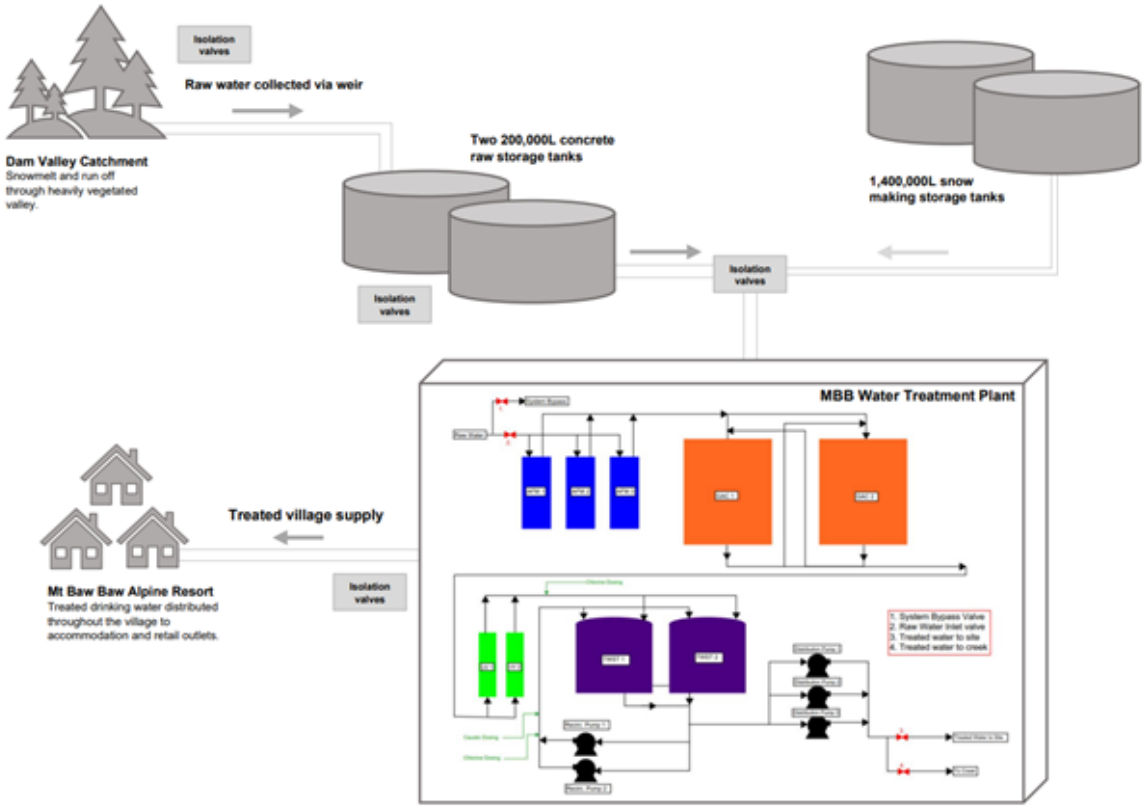


Figure B2.1.3: Mt Baw Baw schematic diagram of village treatment systems (post May 2022).

Activated Filter Material (AFM)
AFM uses amorphous alumino-silicate (glass) to remove 90% of 1-micron and larger particles and acts as a prefilter to reduce fouling and backwash frequency of the GAC filters. Three units provide for redundancy in the event of unexpected faults or planned servicing. Backwashing occurs on an automated time or differential pressure basis to reduce clogging and head loss, improving filtration performance.

Granular Activated Carbon (GAC)
GAC is used to absorb dissolved organic matter, pesticides, algal toxins and compounds which historically have resulted in taste and aesthetic problems in the village supply. GAC filtration when used prior to disinfection reduces the formation of disinfection by-products in later disinfection processes. Two GAC filtration units in a lead/lag configuration provide for redundancy in the event of unexpected faults or planned servicing (media replacement). Backwashing occurs on an automated time or differential pressure basis to reduce clogging and head loss, improving filtration performance.

Ultraviolet disinfection – primary disinfection
The treatment plant consists of two TrojanUVMax SV50 Ultra Violet (UV) units in a duty/standby configuration. These are validated for 3.0-log Cryptosporidium & Giardia inactivation credit, based on MS2 & T1 testing as per USEPA UVDGM 2006.

Sodium Hypochlorite disinfection – secondary disinfection
Sodium Hypochlorite (hypo) is the secondary form of disinfection within the WTP. The residual trim hypo dosing unit provides automated dosing post UV treatment to meet specified set points. Dose rates are controlled through the Human-Machine Interface (HMI) both onsite and remotely and can be adjusted as required. Two pumps are used to supply the course dose of hypo to the system pre clear water storage and a third is used to provide a top up dose on the recirculation line. Analysers provide continuous readings of the Free Available Chlorine (FAC) within clear water storage tanks to allow set points to be withheld at all times.

Sodium Hydroxide
Sodium hydroxide (NaOH) is used to increase the pH of the drinking water post hypo dosing which decreases pH levels. Acidic water has a higher likelihood of corrosion to pipework and equipment making pH adjustment and important process in water treatment.

Table B2: Drinking Water Treatment processes, added substances and byproducts monitored *r.16(e)(ii)*

Location	Treatment Process	Added Substances	Byproducts monitored
Potable Water Treatment Plant	AFM Media Filtration	N/A	N/A
	GAC Filtration	N/A	N/A
	UV Disinfection	N/A	N/A
	Disinfection	Sodium Hypochlorite	THMs
	pH Correction	Caustic Soda	N/A

5.12 Drinking Water Quality Standards

Performance monitoring

During the 2022-23 reporting period, the resort conducted microbiological and chemical performance monitoring in accordance with the SDWR.

To ensure the resort supplies safe, high quality drinking water to consumers, weekly treated water samples are collected from dedicated sampling points within consumer facilities (*figure B1.4.2*). All samples are collected following standard procedures by staff who have undergone competency training and transported to a NATA accredited laboratory for testing. As required under regulation 8 of the SDWR, samples are taken from rotating sample locations to ensure no two consecutive samples are taken from the same locality.

Compliance performance summary

During the 2022-23 reporting period, the resort reported nil events of known or suspected contamination to drinking water, where water quality standards have not been met.

Escherichia coli (E.coli)

Table B3 Summary of *E.coli* results from the current and previous two reporting periods.

Reporting period	Frequency of sampling	No. of samples collected	No. of samples containing *E.coli*	No. of investigations conducted (s.22)	No. of investigations where standard not met
22-23	Weekly	52	0	0	0
21-22	Weekly*	75	0	0	0
20-21	Weekly	52	1	1	1

Standard as stated in Schedule 2 of Safe Drinking Water Regulations 2015:
All samples of drinking water collected are found to contain no *Escherichia coli* per 100 millilitres of drinking water, with the exception of any false positive sample.

All drinking water samples have demonstrated compliance with the SDWR criteria. During the 2022-23 reporting period.

*MBB expanded the sampling schedule to twice weekly for a period of time to verify performance of changing treatment systems and confirm compliance of drinking water quality. This can be seen across a number of parameters within section *3.0 Drinking Water Quality Standards.*

Total Trihalomethanes

Table B4 Summary of Trihalomethanes results from the current and previous two reporting periods.

Reporting period	Frequency of sampling	No. of samples	Max (mg/L)	Average (mg/L)	No. of Non-Complying Samples
22-23	Monthly	12	0.12	0.080	0
21-22	Monthly	12	0.24	0.07	0
20-21	Monthly	12	0.1	0.05	0

Standard as stated in Schedule 2 of Safe Drinking Water Regulations 2015: less than or equal to 0.25 milligrams per litre of drinking water. One sample to be taken per month.
All drinking water samples have demonstrated compliance with the SDWR criteria.

Increase in trends across previous reporting periods were seen with regard to the average recorded value. This trend is representative of increased dosing volumes in the 2022-23 reporting period, all values remain below SDWR limits. During the transition to new treatment systems, chlorine set points were increased to achieve required residuals within the reticulation network, increased THMs were anticipated at this time with the absence of filtration.

Turbidity

Table B5 Summary of Turbidity results from the current and previous two reporting periods.

Reporting period	Frequency of sampling	No of samples	Maximum NTU	95th percentile
22-23	Weekly	60*	0.6	0.25
21-22	Weekly	70*	3.4	0.78
20-21	Weekly	52	0.5	0.4

Standard as stated in Schedule 2 of Safe Drinking Water Regulations 2015: The 95th percentile of results for samples in any 12-month period must be less than or equal to 5·0 Nephelometric Turbidity Units.

All drinking water samples have demonstrated compliance with the SDWR. Two outliers were recorded during the 2021-22 reporting period, with one in early January (3.4NTU) and the second in late January (1.5NTU). There was no explanation or likely event relating to this unusually high reading, following samples from the site and surrounding sample points recorded averages of <0.4NTU. The 95th percentile of results during the latest reporting period remained less than 0.8NTU, with the average excluding two mentioned outliers being 0.28NTU.

*During the commissioning of the new treatment plant beginning March 2022 through until September 2022, additional samples were taken to confirm performance. This was based on 1 x additional sample per week during this period.

5.13 Other Water Quality Standards

As previously discussed, MBBAR utilises a multi-barrier approach to mitigate microbial risks in the drinking water supply. Water testing is conducted on a regular basis for the presence and levels of chlorine disinfection by-products, chloroacetic acid, dichloroacetic acid and trichloroacetic acid. Chlorite, as the by-product of chlorine dioxide (used up until mid-May 2022) has been incorporated in this Annual Report.

Chloroacetic Acid

Chloroacetic acid sampled post treatment within the reticulation network at the points shown in *figure B1.4.2* to determine levels of chlorine treatment by-products.

Table B6 Summary of Chloroacetic Acid results from the current and previous two reporting periods.

Reporting period	Frequency of sampling	No. of samples	No. of Non - Complying Samples	Max mg/L	Average mg/L	No. of Non-Complying Samples
22-23	Monthly	12	0	0.006	0.005	0
21-22	Monthly	12	0	0.008	0.007	0
20-21	Monthly	12	0	<0.005	<0.005	0

ADWG: concentrations of chloroacetic acid in drinking water should not exceed 0.15 mg/L.

All drinking water samples have demonstrated compliance with the ADWG criteria.
An increase in maximum and average Chloroacetic Acid readings have been recorded as a result of increased hypo usage in the 2022-23 reporting period, due to the change to the new treatment plant. Refer to section *Total Trihalomethanes*.

Dichloroacetic Acid

Dichloroacetic acid sampled post treatment within the reticulation network at the points shown in *figure B1.4.2* to determine levels of chlorine treatment by-products.

Table B7 Summary of Dichloroacetic Acid results from the current and previous two reporting periods.

Reporting period	Frequency of sampling	No. of samples	No. of Non - Complying samples	Max mg/L	Average mg/L	No. of Non-Complying Samples
22-23	Monthly	12	0	0.073	0.056	0
21-22	Monthly	12	0	0.079	0.028	0
20-21	Monthly	12	0	0.043	0.016	0

ADWG: concentrations of dichloroacetic acid in drinking water should not exceed 0.10 mg/L.
All drinking water samples have demonstrated compliance with the ADWG criteria.

An increase in maximum and average Dichloroacetic Acid readings have been recorded as a result of increased hypo usage in the 2022-23 reporting period, due to the change to the new treatment plant. Refer to section *Total Trihalomethanes*.

Trichloroacetic Acid

Trichloroacetic acid sampled post treatment within the reticulation network at points shown in *figure B1.4.2* to determine levels of chlorine treatment by-products.

Table B8 Summary of Trichloroacetic Acid results from the current and previous two reporting periods.

Reporting period	Frequency of sampling	No. of samples	No. of Non - Complying samples	Max mg/L	Average mg/L	No. of Non-Complying Samples
22-23	Monthly	12	0	0.091	0.068	0
21-22	Monthly	12	0	0.012	0.029	0
20-21	Monthly	12	0	0.044	0.015	0

ADWG: concentrations of trichloroacetic acid in drinking water should not exceed 0.10 mg/L.

All drinking water samples have demonstrated compliance with the ADWG criteria.
An increase in maximum and average Trihloroacetic Acid readings have been recorded as a result of increased hypo usage in the 2022-23 reporting period, due to the change to the new treatment plant. Refer to section *Total Trihalomethanes*.

Chlorite

Chlorite sampled post treatment within the reticulation network at points shown in *figure B1.4.2* to determine levels of chlorine treatment by-products.

Table B9 Summary of Chlorite results from the current and previous two reporting periods.

Reporting period	Frequency of sampling	No. of samples	No. of Non - Complying samples	Max mg/L	Average mg/L	No. of Non-Complying Samples
22-23	Discontinued	-	-	-	-	-
21-22	Weekly	38	0	0.52	0.07	0

ADWG: concentrations of Chlorite in drinking water should not exceed 0.80 mg/L. Action to reduce chlorite is encouraged, but must not compromise disinfection, as non-disinfected water poses significantly greater risk than chlorite.

All drinking water samples have demonstrated compliance with the ADWG criteria. Chlorite was included in sampling from mid-June 2021 to late-March 2022, during the period that Chlorine Dioxide was used for drinking water treatment. During the introduction of this chemical, by-products were monitored closely from four sites per week, across two weekly sampling events. Sampling frequency was then reduced as results were consistently <0.05mg/L. Chlorite was removed from the sampling regime in late March 2022, once dosing was discontinued and the risk of by-products eliminated.

Alpha Radiation

Alpha Radiation has been tested using raw water samples sourced from Dam Valley catchment (*figure B1.4.1*) to determine screening levels.

Table B10 Summary of Alpha Radiation results from the current and previous two reporting periods.

Reporting period	Frequency of sampling	No. of samples	No. of Non – Complying samples	Max Bq/L	No. of Non-Complying Samples
22-23	Annually	1	0	<0.05	0
21-22	Annually	1	0	<0.05	0
20-21	Annually	1	0	<0.05	0

ADWG: recommended screening levels for alpha radiation are 0.5 Bq/L

All drinking water samples have demonstrated compliance with the ADWG criteria. No significant trends from the previous two reporting periods are evident.

Beta Radiation

Beta Radiation has been tested using raw water samples sourced from Dam Valley catchment (*figure B1.4.1*) to determine screening levels.

Table B11 Summary of Beta Radiation results from the current and previous two reporting periods.

Reporting period	Frequency of sampling	No. of samples	No. of Non - Complying samples	Max Bq/L	No. of Non-Complying Samples
22-23	Annually	1	0	<0.1	0
21-22	Annually	1	0	<0.1	0
20-21	Annually	1	0	<0.1	0

ADWG: recommended screening levels for beta radiation are 0.5 Bq/L
All drinking water samples have demonstrated compliance with the ADWG criteria. No significant trends from the previous two reporting periods are evident.

Copper
Copper tests were sampled from raw water supply tank samples (*figure B1.4.1*).

Table B11 Summary of Copper results from the current and previous two reporting periods.

Reporting period	Frequency of sampling	No. of samples	No. of non-complying samples	Maximum mg/L	Average mg/L	No. of Non-Complying Samples
22-23	Monthly	8*	0	0.008	0.005	0
20-22	Monthly	12	0	0.003	0.001	0
20-21	Monthly	12	0	<0.001	<0.001	0

ADWG: for health considerations, concentrations of copper should not exceed the guideline value of 2 mg/L.
All drinking water samples have demonstrated compliance with the ADWG criteria. No significant trends from the previous two reporting periods are evident.
* Per advice in OFI-23-014 these were discontinued post audit.

Manganese
Manganese tests were sampled from raw water supply tank samples (*figure B1.4.1*).

Table B12 Summary of Manganese results from the current and previous two reporting periods.

Reporting period	Frequency of sampling	No. of samples	No. of non-complying samples	Maximum mg/L	Average mg/L	No. of Non-Complying Samples
22-23	Monthly	8*	0	0.001	0.003	0
21-22	Monthly	12	0	0.004	0.001	0
20-21	Monthly	12	0	0.008	0.002	0

ADWG: manganese may cause health considerations if exceeding 0.5 mg/L however, for aesthetic considerations drinking water should not exceed 0.1 mg/L at point of consumption.

All drinking water samples have demonstrated compliance with the ADWG criteria. No significant trends from the previous two reporting periods are evident.
* Per advice in OFI-23-014 these were discontinued post audit.

5.14 Aesthetic Water Quality

pH

pH tests were assessed within the reticulation network at 5 points shown in *figure B1.4.2*.

Table B13 Summary of pH results from the current and previous two reporting periods.

Reporting period	Frequency of sampling	No. of samples	Minimum pH	Maximum pH	Mean pH
22-23	Weekly	52	6.2	7.8	6.7
21-22	Weekly	52	4.5	9.4	6.3
20-21	Weekly	51	5.8	10.1	6.9

ADWG: with respect to aesthetic considerations and to reduce corrosion of pipes and fittings, drinking water pH levels should be between 6.5 and 8.5. There are no health-based guideline values for pH.

Average pH from drinking water samples have demonstrated compliance with the ADWG criteria. During the reporting period, minimum and maximum values exceeded the desired range, with fluctuation across sample sites. An overall decrease in pH can be seen as a whole from previous reporting periods. pH correction is now in place (post May 2022) however fluctuation across sample sites is anticipated as a result of pipework material types.

True Colour

True colour tests were assessed using samples taken within the reticulation network at the points shown in *figure B1.4.2*.

Table B14 Summary of True Colour results from the current and previous two reporting periods.

Reporting period	Frequency of sampling	No. of samples	Minimum - HU	Maximum - HU	Mean - HU
22-23	Weekly	52	2.0	14	10.2
21-22	Weekly	52	4.0	25	12.6
20-21	Weekly	51	14	30	24.6

ADWG: with respect to aesthetic considerations, true colour for drinking water should not exceed 15HU. There are no health-based guideline values for true colour.

With the use of chlorine dioxide (pre May 2022) and filtration (post May 2022) a reduction in the minimum, maximum and mean true colour can be seen across the latest reporting period. Historically, the Resort has recorded high colour HU due to the amount of organic matter in the raw water. Though it is understood the MMBAR catchment is of high quality, a significant volume of organic particulate contributes to aesthetic quality issues the Resort faces.

SECTION C – EMERGENCY AND INCIDENT MANAGEMENT

5.15 Risk Management Plan

In accordance with the Act, the Board as the responsible water supplier has:

- Prepared a risk management plan for the regulated water.
- That the risk management plan contains the matters detailed in Regulation 6 of the *Safe Drinking Water Regulations* (except those that specifically relate to drinking water only).
- Undertaken a risk management plan audit as required, by the Secretary to the Department of Health by an approved auditor.

5.16 Review of the Risk Management Plan

The risk management plan has been divided into an individual plan for each of the Resort. The division ensures both Resorts have a comprehensive risk management plan that details the system specifics and remains operationally accessible. Both Resorts operate independently, though governed by the one Board, risk management practices and its implementation are required to be site specific to ensure all aspects of the plan can remain under consistent review.

During the reporting period, significant development of new procedures and systems to guide response to water quality concerns, exceedances and communications occurred. Minor updates to the risk matrix in addition to new operations procedures and interim monitoring schedules were implemented while the Resort operated off the interim treatment plant (chlorine dioxide). Following the install and commissioning of the new WTP at MBB, the risk management plan has been updated in full to reflect system upgrades and changes to risk management from catchment to tap. The MBB RMP is to be reviewed by consultants in late 2022, ahead of being thoroughly reviewed by an accredited auditor during the 2023 audit.

5.17 Findings of the most recent risk management plan audit

r.16(d)

Risk management plans are required to be audited by independent auditors at periods declared by the Department of Health. A summary of the audit findings and any issues raised by the auditor are required to be provided in this Resort.

During the most recent audit in March 2023, MBBAR and LMAR were found to have **not complied** with obligations imposed by section 7(1) of the *Safe Drinking Water Act 2003*.

The following items were identified as part of the audit findings:

Table B15 Major Non-Compliance Items

Ref to Act and Reg	Audit Finding Summary	Location
r. 8(1)(c)	MBBAR failed to notify DH appropriately of a water quality incident. MBBAR failed to notify DH appropriately of the planned use of untreated water within the distribution network.	MBBAR
r. 8(1)(g)	Location of sample and control points for chlorine dosing on the recirculation line does not provide accurate representation of water supplied to the village distribution network.	MBBAR

r. 8(1)(i)(i) r. 8(1)(i)(ii) r. 8(1)(i)(iii)	Calculations for chlorine contact indicate the required C.t cannot be achieved at the SCADA Low Low alarm setpoint for chlorine concentration. Calculations are incorrect based on the plant production rate and not the village supply rate. UV alarms not monitored via SCADA despite this being a critical step for log reductions of protozoa – flow, UVT and UV sensor	MBBAR
r. 8(2)(a) r. 8(2)(b)(i) r. 8 (2)(b)(ii)	No methodology presented for quantification of microbial hazards.	MBBAR
r. 8(3)(c)	Alarm limits set in SCADA do not match defined CCP limits in the risk management plan.	MBBAR

Table B16 Minor Non-Compliance Items

Ref to Act and Reg	Audit Finding Summary	Location
s. 7(1)(a) s. 8(1)(a) r. 8, r. 9	MBBAR risk management plan does not identify the extent of microorganisms in the raw water, or the extent to which they are removed by the treatment processes.	MBBAR
s. 7(1)(b) s. 8(1)(b)	Regulated water awareness training for staff and contractor inductions do not address the use of non-potable water at LMAR.	LMAR
s. 7(1)(d) s. 8(1)(d)	Risk assessment did not address residual risks and overstates some risks. Requires a comprehensive review and update.	MBBAR
r. 8(1)(d)(vi)	No monitoring or historical data UVT for the water supply.	MBBAR
r. 8(1)(e)(i) r. 8(1)(e)(ii)	No quality assurance process evident for procurement of chemicals additives used in the treatment steps.	MBBAR

Table B17 Opportunities for Improvement

Note that all previous OFIs are now considered closed and the table below highlights all new actions.

OFI ID	Audit Finding Summary	Action	Status
OFI-23-001 MBBAR	The MBB risk management plan must include details of the methodology used to quantify microbial hazards in raw water and the extent that the treatment process removes or reduces them.	Update RMP justification for category 2 under the WSAA guidelines	In progress
OFI-23-002 MBBAR	In the MBB risk management plan, update Table 3 to more accurately reflect the risk assessment register.	Update RMP	In progress
OFI-23-003 LMAR	In the LM risk register consider more explicitly assessing the risk of showering in regulated water. Having a separate hazardous event for it may identify alternative controls	Create separate hazardous event to address showering in regulated water.	In progress

OFI-23-004 MBBAR & LMAR	It is suggested that at the next scheduled risk assessment for MBB and LM that consideration is given to the rationalisation to the number of hazardous events, focusing on modes of failure. As well as the effectiveness of controls on residual risk, as it appears to be overestimated in some instances.	Review risk ratings as part of RMP overall review process	Complete
OFI-23-005	Control limits should be considered at LM to ensure that water used in the regulated supply is suitable for primary contact	Review appropriate control limits for regulated water.	In progress
OFI-23-006	The LM induction training for staff and contractors must include awareness of the use of regulated water at the resort	Create an induction process which includes regulated water information.	In progress
OFI-23-007 MBBAR	The MBB risk assessment methodology states that where residual risk remains additional actions or investigations will be proposed. Not all risks require additional actions, the level of risk appetite should be specified in the risk management plan to identify those that require further treatment. Review the risk assessment and identify a realistic level of residual risk, trying not to overstate it. Any risk with an unacceptable residual risk should then have an additional risk treatment proposed. These can then be tracked in the Improvement Action Plan	Update RMP as part of overall review process. Incorporate any additional treatments into the improvement action plan	Complete
OFI-23-008 MBBAR	Update the MBB Improvement Action Plan to be a register that is separate from the risk management so it can be used to regularly track progress of items. Ideally it would additionally include the person or position responsible for each action, the due date for the action to be completed and the source of the improvement action.	Move improvement action plan and create a link	Complete
OFI-23-009 MBBAR	It is recommended to review the MBB RMP and add the following in the schematic and scheme description where appropriate: Add in the 10 micro filter at the weir. This was initially considered to be temporary but is still in place. Show that the Snow Making Storage Tanks are physically disconnected from the treatment plant. Add the online monitoring locations to the treatment plant schematic.	Update schematic to include monitoring points	In Progress

OFI-23-010 LMAR	It is recommended to review the LM RMP schematic of the scheme and a clear statement of the intended uses	Update RMP and schematic	In progress
OFI-23-011 MBBAR	It would be beneficial to broaden the scope of the Emergency Response Procedure - E. coli Detections so it covers all water quality incidents, whilst keeping the specific detail of managing an E. coli detection.	Develop new SOPs to address other response requirements including s18	In progress
OFI-23-012 LMAR	Section 15 of the LM RMP should be updated as the non-drinking water specific requirements of r. 8(1)(d) do apply to regulated water schemes.	Update RMP	In progress
OFI-23-013 MBBAR	UVT should be monitored after the GAC at MBB at least monthly to ensure that UV performance is maintained. This could be reviewed once a body of data is collected and the processes are understood.	Update sampling program to include UVT monthly sample. Samples to be monitored over 12 month period	In progress
OFI-23-014 MBBAR	Consider stopping the monthly catchment sampling and test the Village samples monthly for metals.	Cease catchment samples. Add village metal samples.	In progress
OFI-23-015 MBBAR	Consult with DH on the need to test for chlorate.	Consultation required.	In progress
OFI-23-016	Ensure that there are quality assurance processes in place for the procurement of chemicals, whether procured by MBB or their contractor.	Ensure compliance assays provided with chemical supply by contractor	In progress
OFI-23-017 MBBAR	The MBB Drinking Water Quality Policy requires contractors to be aware of drinking water quality management system. Consider preparing training that contractors could undertake before working on MBBs drinking water system and keep records of the training.	Induction process to include specific SOP for work on water system.	In progress
OFI-23-018 MBBAR	A review of the MBB residual chlorine online monitoring is required to ensure that it is in the correct position in relation to the chemical dosing points.	Review with plant contractor and alter.	Complete
OFI-23-019 MBBAR	A review of the MBB CCPs is required to ensure that they have the correct limits in place so that the treatment plant always achieves the required LRVs for the chlorine and UV disinfection processes. The filtration process will also need to be taken into account as it is required to ensure the appropriate operation of both the UV and chlorination systems.	To be completed in conjunction with OFI-23-001. Engage technical consultant to review all limits as part of update.	In progress

OFI-23-020 MBBAR	The methodology for the quantification of microbial hazards must be identified for the MBB scheme and undertaken to assess the extent that pathogenic microorganisms are in the source water and that the treatment processes reduce or remove them.	To be completed in conjunction with OFI-23-001.	In progress
OFI-23-021 MBBAR	Consider developing a policy for the types and locations of recreational activities in the MBB drinking water catchment.	Review recreational activities undertaken in the catchment and confirm if policy is required.	In progress
OFI-23-022 MBBAR	Ensure that the adjustment and critical limits in the MBB risk management plan are reflected in SCADA. Exceeding a critical limit must result in timely action to prevent the supply of contaminated water. Where possible this should be automated.	To be completed in conjunction with OFI-23-001	In progress
OFI-23-023 MBBAR	It is recommended to move away from using an email client as a records management system. It is best to have a central electronic document management that can be accessed by all of the relevant staff. The equivalent of a plant diary would also be useful to record day-to-day activities and observation.	Samples results to be located in central file storage. OneNote plant diary proposed for operators.	Complete

5.18 Known or Suspected Contamination reported under Section 22

During the 2022-23 compliance period there were no incidents that occurred requiring reporting to the Department of Health under *Section 22 of the Safe Drinking Water Act*.

5.19 Known or Suspected Water Quality incidents reported under Section 18

During the 2022-23 compliance period there were no incidents that occurred requiring reporting to the Department of Health under *Section 18 of the Safe Drinking Water Act*.

5.20 Water quality complaints 2022/23

There were no complaints in this reporting period.

Glossary of Terms

Act	Safe Drinking Water Act 2003
ADWG	Australian Drinking Water Guidelines 2011
AWA	Australian Water Association
ARV	Alpine Resorts Victoria
CMA	Catchment Management Authority
DH	Department of Health
DELWP	Department of Environment, Land, Water and Planning
DWQMS	Drinking Water Quality Management System
E. coli	Escherichia coli – organism that indicates faecal contamination. Used as an indicator of safe drinking water
EMP	Emergency Management Plan
EPA	Environment Protection Authority
FCAR	Falls Creek Alpine Resort
kL	Kilolitre – 1,000 litres
LMAR	Lake Mountain Alpine Resort
MBBAR	Mt Baw Baw Alpine Resort
MBMSAR	Mt Buller & Mt Stirling Alpine Resort
MHAR	Mt Hotham Alpine Resort
ML	Megalitre – 1,000,000 litres
MOU	Memorandum of Understanding
NTU	Nephelometric Turbidity Units (see Turbidity)
OHS	Occupational Health and Safety
pH	Measure of the acidity or basicity of water
Potable	Drinkable, suitable for human consumption
Regulations	Safe Drinking Water Regulations 2015
Turbidity	A measure water cloudiness
THMs	Trihalomethanes
UV	Ultraviolet

ATTACHMENT 1 – RISK MANAGEMENT PLAN AUDIT CERTIFICATES

Falls Creek Alpine Resort

Mount Hotham Alpine Resort

Mount Buller & Mount Stirling Alpine Resort

Mount Baw Baw & Lake Mountain Alpine Resorts

Schedule 1

Regulation 10

Safe Drinking Water Regulations 2015

RISK MANAGEMENT PLAN AUDIT CERTIFICATE

Certificate Number: 187

Audit period: 01 January 2021 to 31 December 2022

To: Mr Fred Weir
Asset & Operations Manager
Falls Creek Alpine Resort
1 Slalom Street, Falls Creek
Victoria 3699.

Australian Business Number (ABN): **33 432 219 067**

I, Dr.Pararajasegram (Dharma) Dharmabalan, after conducting a risk management plan audit of the water supplied by Falls Creek Alpine Resort, am of the opinion that—

Falls Creek Alpine Resort has complied with the obligations imposed by section 7(1) of the ***Safe Drinking Water Act*** **2003** during the audit period.

Signature of approved auditor: _____

Dr.P. (Dharma) Dharmabalan

Date: 10 April 2023

Exemplar Global Certified Auditor
Drinking Water QMS Scheme
Certificate Number 14555

20th May 2023

Dharmabalan Advisory
ABN 41313696992
10 Dartmoor Drive
Highton, Vic. 3216
+61419765881
dharmabalan@bigpond.com

Ms Suzie Sarkis
Manager Water
Water Unit, Health Protection Branch
Department of Health
14/50 Lonsdale Street
Melbourne, Vic 3000.

Dear Suzie;

Re: Revised Drinking Water Risk Management Plan Audit Report – Alpine Resorts Victoria (Falls Creek Resort)

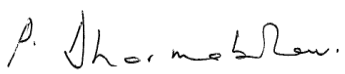
I received a communique from DHS highlighting the omission of the section relating to the 2019-20 OFIs' progress.

At the time of the audit, I reviewed and inspected, where ever appropriate, all the OFIs listed in 2019-2020.

The submitted audit report is amended to include two additional sections, 3.1 and 6.0, detailing the progress during the previous audit and action for the current audit.

Apologies for the oversight of this requirement, and please accept the audit report as having been amended accordingly.

Regards,



Dr Dharma Dharmabalan
WQMS Auditor
Exemplar Global
Certificate No:14555

Risk Management Plan Audit Certificate
Safe Drinking Water Regulations 2015

Certificate Number: 200
Audit period: 1 January 2021 – 31 December 2022

To:
Josh Last
Manager Maintenance & Operations
Alpine Resorts Victoria (Mount Baw Baw and Lake Mountain)
PO Box 55
MARYSVILLE VIC 3779

Australian Business Number (ABN): 33 432 219 067

I, James Howey, after conducting a risk management plan audit of the water supplied by Alpine Resorts Victoria (Mount Baw Baw and Lake Mountain), am of the opinion that Alpine Resorts Victoria *has not* complied with the obligations imposed by section 7(1) of the *Safe Drinking Water Act 2003* during the audit period.

James Howey

22/3/2023

Schedule 1

Regulation 10

Safe Drinking Water Regulations 2015

RISK MANAGEMENT PLAN AUDIT CERTIFICATE

Certificate Number: 194

Audit period: 01 January 2021 to 31 December 2022

To: Mr. Mark Bennetts
Chief Operating Officer
Mt Buller Mt Stirling Resort Management
10 Summit Road, Mt Buller VIC 3723

Australian Business Number (ABN): 33 432 219 067

I, Dr.Pararajasegram (Dharma) Dharmabalan, after conducting a risk management plan audit of the water supplied by Mount Buller and Mount Stirling Alpine Resort, am of the opinion that—

Mount Buller and Mount Stirling Alpine Resort have complied with the obligations imposed by section 7(1) of the ***Safe Drinking Water Act*** **2003** during the audit period.

Signature of approved auditor: _____

Dr.P. (Dharma) Dharmabalan

Date: 10 April 2023

Exemplar Global Certified Auditor
Drinking Water QMS Scheme
Certificate Number 14555

Risk management plan audit certificate

Regulation 10

Safe Drinking Water Regulations 2015

Certificate Number: 2023_001

Audit period: 1 January 2021 – 31 December 2022

To:

Mr. Mick Cherry
Infrastructure Senior Manager
Mt Hotham Alpine Resort
28 Great Alpine Road,
Hotham Heights, VIC 3741

Australian Business Number: 93 938 780 598

I, Sallyanne Bartlett, after conducting a risk management plan audit of the water supplied by Mt Hotham Alpine Resort (MHAR), am of the opinion that –

HMAR *has not* complied with obligations imposed by section 7(1) of the **Safe Drinking Water Act 2003** during the audit period.

The details for the reasons for non-compliance are –

- **s.9(1)(d)** development and implementation of preventative strategies (including appropriate control and monitoring measures) **minor non-compliance** - there is not a control measure in place to provide an immediate alert if the UV disinfection process performance is suboptimal i.e. UVI < 80%.
- **s.9(1)(d)** development and implementation of preventative strategies (including appropriate control and monitoring measures) **minor non-compliance** - there is not a control measure in place to provide an immediate alert if the emergency chlorine disinfection performance is suboptimal i.e. under / over dosing.
- **r. 8(1)(d)(v)** samples collected at the same sample location on two consecutive occasions **minor non-compliance** – THM samples collected from the same sample location on two consecutive occasions.
- **r. 8(1)(i)** the risk management plan must identify all critical control points, specify critical limits and detail any actions etc. that are applied when a critical limit is exceeded **minor non-compliance** – the MHAR Drinking Water Safety Management Plan (DWSMP) does not identify the treatment processes (UV and chlorine disinfection) as critical control points with limits and corrective action documented if a critical limit is exceeded.

Sallyanne Bartlett

27 April 2023

Sallyanne Bartlett
WaterQPlus Pty Ltd
PO Box 77
Maiden Gully, VIC 3551

Suzie Sarkis
Manager Water
Department of Health
50 Lonsdale Street
Melbourne, VIC 3000

12 September 2023

Dear Suzie,

Re: Alpine Victoria Resort (Mount Hotham Alpine Resort) Safe Drinking Water Risk Management Plan Audit Certificate and Report

I am writing to you in response to the email correspondence, from Carmella Luisetto (Victorian Department of Health), received by WaterQPlus Pty Ltd on 29 August 2023, regarding the Alpine Resorts Victoria (Mount Hotham Alpine Resort) Safe Drinking Water Risk Management Plan audit certificate and report (dated 27 April 2023). This letter provides WaterQPlus' response to the administrative omissions and errors identified by the DH.

Audit Certificate

The risk management plan audit certificate for Alpine Resorts Victoria (Mount Hotham Alpine Resort) dated 27 April 2023:

- incorrectly named the water agency as Mt Hotham Alpine Resort, the correct water agency name is **Alpine Resorts Victoria (Mount Hotham Alpine Resort)**, and,
- contained an incorrect certificate number of 2023_001, the corrected certificate number is 195.

WaterQPlus advises the printed name on the audit certificate will be replaced by the electronic signature accompanying this letter. Further, WaterQPlus request that the audit certificate be treated as having been amended accordingly.

Audit Report

The risk management plan audit report for Alpine Resorts Victoria (Mount Hotham Alpine Resort) dated 27 April 2023:

- incorrectly named the water agency as Mt Hotham Alpine Resort, the correct water agency name is **Alpine Resorts Victoria (Mount Hotham Alpine Resort)**,
- contained observations, **Attachment A** of this letter advises the intent of the improvements classified as 'observations' compared to the 'opportunities for improvement',
- omitted the progress of some opportunities for improvement and also closed OFI-2 and OFI-3 when the associated actions have not been completed for the 2019-20 risk management plan audit period, **Attachment B** to this letter includes all the opportunities for improvement in a revised table 4.5.1 and documents the water agency's progress and explains the closed status of OFI-2 and OFI-3).

WaterQPlus request that the audit report be treated as having been amended accordingly.

Kind regards,

Sallyanne Bartlett

cc. Mr. Mick Cherry
Senior Manager of Infrastructure
Alpine Resorts Victoria (Mount Hotham Alpine Resort)

Attachment A

The text below is an extract from the Alpine Resorts Victoria (Mount Hotham Alpine Resort) risk management plan audit report and communicates the intent of each observation.

Upon review, the intent of **three** of the observations raised in the risk management plan audit report was to guide Alpine Resorts Victoria (Mount Hotham Alpine Resort) to consider an action. These were O-3, O-4 and O-6. The considered action is documented below as an opportunity for improvement as per the Safe Drinking Water Act 2003 risk management plan regulatory audit – Guidance information, pages 12 and 13, that requires the auditor to make an assessment of compliance and where some implementation issues may be considered so trivial that they do not warrant a finding of minor noncompliance; these findings should be classified as 'opportunities for improvement'.

For the remaining **five** observations, the intent was to provide a reminder of audit discussions, provide feedback or highlight a statement. No further specific action is intended.

Observations (O)

(O-1) It was observed during the audit the DWSMP draft version 1 may benefit from a review against the structure of the ADWG Framework for Management of Drinking Water Quality: the 12 elements to ensure each of the components and actions are considered.

INTENT

The onsite audit discussions reminded Alpine Resorts Victoria (Mount Hotham Alpine Resort) that the Australian Drinking Water Guidelines (ADWG) is the authoritative reference for the Australian water industry. The ADWG Framework for Management of Drinking Water Quality (the twelve elements) lists the components and actions to guide a water agency in the preparation of a risk management plan. **No further specific action is intended.**

(O - 2) It was observed on the risk register that a burst or leaking mains pipeline is rated as a high residual risk for some segments of the drinking water reticulation due to asset condition rather than drinking water quality safety risk. It may be beneficial to review these aspects of the risk assessment and align MHAR's technical capability (to respond and repair) and operational data (occurrence), in terms of drinking water quality safety risk, to categorise the likelihood and consequence (potential impact) of a burst or leaking mains pipeline.

INTENT

The onsite audit discussions reminded Alpine Resorts Victoria (Mount Hotham Alpine Resort) that the water quality risk register focus is on the water quality safety risk and the preventative strategies/control measures in place to prevent a pipe burst/leak causing water contamination. WaterQPlus observed adequate preventative strategies/control measures, and therefore, queried the high residual risk rating for segments of the drinking water reticulation. **No further specific action is intended.**

(O - 3) It was observed in the raw water pump house that key components of the drinking water supply system were not labelled e.g. pipework, the 2mm and 200-micron mesh filters, and the turbidity meter. The Good Practice Guide to the Operation of Drinking Water Supply Systems for the Management of Microbial Risk pg. 14 (Water Research Australia, second edition, 2020) provides guidance regarding drinking water supply system infrastructure labelling.

INTENT

The intent is to guide Alpine Resorts Victoria (Mount Hotham Alpine Resort) to consider an action, and therefore, an opportunity for improvement exists, in relation to s. 9(1)(d), to label the pipework as per the Good Practice Guide to the Operation of Drinking Water Supply Systems for the Management of Microbial Risk pg. 14 (Water Research Australia, second edition, 2020) as a further preventative strategy/control measure (**OFI – 10**).

(O - 4) It was observed the Potable Water Supply System Critical Control Point Plan would benefit from some additional details, such as, the raw water weir sample points, the location for treatment plant performance monitoring i.e. UVI meter and clearly indicating Critical Control Points (CCP) within the system.

INTENT
The intent is to guide Alpine Resorts Victoria (Mount Hotham Alpine Resort) to consider an action, and therefore, an opportunity for improvement exists, in relation to s. 9(1)(a), is to include the raw water weir sample points, the location for treatment plant performance monitoring i.e. UVI meter and indicating Critical Control Points (CCP) within the system on the Potable Water Supply System Critical Control Point Plan (**OFI – 11**).

(O - 5) It was observed the Call Services Australia emergency contact number was not easily located on the Mt Hotham website. A more prominent display would assist the public to report issues without delay.

INTENT
The intent is to provide Alpine Resorts Victoria (Mount Hotham Alpine Resort) with the feedback that, while all the information was available on the webpage, the auditor did not find it easy to locate the emergency contact number. **No further specific action is intended.**

(O – 6) It was observed the MHAR Emergency Management procedures does not address a Do Not Drink Advisory. The drafting of a Do Not Drink Advisory will aid preparedness should a situation occur that warrants this type of communication.

INTENT
The intent is to guide Alpine Resorts Victoria (Mount Hotham Alpine Resort) to consider an action, and therefore, an opportunity for improvement exists, in relation to s. 9(1)(c), to improve emergency preparedness by drafting a Do Not Drink Advisory as an emergency response procedure (**OFI – 12**).

(O – 7) It was observed the MHAR Catchment Sanitary and Vulnerability Assessment and treatment capability information is not communicated in one single document or report.

INTENT
The intent is to provide Alpine Resorts Victoria (Mount Hotham Alpine Resort) with a statement that the auditor observed that the information related to r.8(2)(a) and r.8(b)(i – ii) is not located in one singular report but rather in different sections of the risk management plant. **No further specific action is intended.**

(O – 8) It was observed the MHAR process to control documentation with version/revision numbers could be improved.

INTENT
The intent is to provide Alpine Resorts Victoria (Mount Hotham Alpine Resort) feedback regarding the version/revision status of some documentation, noting all risk management plan documentation relating to the content and/or evidence of implementation was made available. **No further specific action is intended.**

Attachment B

An updated version of the Alpine Resorts Victoria (Mount Hotham Alpine Resort) Risk Management Plan audit report Table 4.5.1 is provided below including the additional information requested by the DH.

Note the audit finding 2019-20 reference – OFI-2 remains open until Alpine Resorts Victoria (Mount Hotham) completes the installation of a new raw water tank. Audit finding 2019-20 reference – OFI-3 is closed as new sample points at the reticulation extremities have been installed including one at the Heavenly Valley Toilets – action complete.

Table 4.5.1 Review of previous audit findings

Audit report period	Details	Actions (as communicated to DH by MHAR)	Status	Follow up – 18 April 2023
2019_20 Reference – OFI-1	Undertake a review to enhance the efficient use of the existing team and resources to manage the existing infrastructure effectively. Also, to support the ongoing delivery of projects. Suggest also the review should include a description of the roles, responsibilities, duties, and training requirements.	Positions descriptions updated. Training register and new online database established.	**Closed**	Position descriptions updated and included in the DWSMP; training database used is Employment Hero; an updated training matrix sighted. This OFI is closed.
2019_20 Reference – OFI-2	Also, a high priority is the upgrade of the old clear water storage tanks (2); suggest replacing with a new modern tank with increased capacity.	The 2 - existing – 80kL Tanks have been disconnected and decommissioned. Planning commenced on design and approvals for a upscaled replacement storage tank. Federal funding is to be sought for construction.	**Open**	Grant funding for the construction of a new upgraded concrete storage tank has been secured from the Federal Government. The MHAR 2023/24 Capex budget has an allocation for the construction works. The new 2.2 mL concrete storage tank design is nearing completion and will form the basis of a tender process. Preliminary site works are scheduled to commence in October 2023. The 2 - existing 80kL concrete tanks that are disconnected and decommissioned are scheduled to be demolished in November 2023. The existing conditions of storage tanks currently on-site at Mt Higinbotham are as follows: 1 – 80 kL concrete tank (decommissioned). 1 – 80 kL concrete tank (decommissioned). 1 – 420kL concrete tank (currently on-line)

Audit report period	Details	Actions (as communicated to DH by MHAR)	Status	Follow up – 18 April 2023
				1 – 795kL metal tank (currently on-line) 1 – 1.2 mL metal tank (currently on-line) Total number of existing tanks currently on-site – 5. Total current volume of raw water stored capacity – 2.415mL. To make way for the new 2.2mL concrete tank, the existing 420kL concrete tank will also be disconnected and demolished. Following the completion of the construction of the new concrete tank, the configuration of the raw water storage tanks on-site will be as follows. 1- new 2.2mL concrete tank. 1 - existing 795kL metal tank. 1 – existing 1.2mL metal tank. Total revised number of storage tanks on-site – 3. Total upgraded volume of raw water stored capacity - 4.195mL. This is an increase in raw water stored capacity of 1.78mL. Audit visited the site. It is noted the OFI remains open, as the new tank has not been commissioned, however, the water quality risk posed by the poor condition of the old tanks, that were in service, is no longer present (as no longer in service or connected to the reticulation). The construction and commissioning of the new tanks is an asset improvement to provide additional storage volume to accommodate the growth and development of the Mount Hotham village area. Two other existing raw water tanks will remain in service (no integrity issues were observed).
2019_20 Reference – OFI - 3	Additional sampling points would be helpful, especially if integrated with the fire hydrants upgrade. This is also a high priority with a suggestion for one of the additional sampling points to be located at Loch Car Park / Heavenly Valley Toilets.	Two new sampling points were commissioned. A further new point at the Proposed Alpine Gateway Car Park and Visitor Centre will be considered.	**Closed**	Two new permanent sample points have been installed at the reticulation extremities (evidence sighted Heavenly Valley Toilets and Slatey Shed Technical Services Workshop during the audit); An additional sample point will be considered for the Alpine Gateway Car Park and Visitor Centre facility. (Sighted design drawings) this may be in addition to the existing Heavenly Valley Toilet sample point; Mount Hotham Alpine Resort is continually developing with new infrastructure and are therefore reviewing the

Audit report period	Details	Actions (as communicated to DH by MHAR)	Status	Follow up – 18 April 2023
				drinking water supplied to these areas and installing sampling points as required as part of routine risk management activities. This OFI is now closed; Two new sample points, located at the Heavenly Valley Toilets and at the Slatey Shed Technical Services Workshop, have been installed.
2019_20 Reference – OFI - 4	While there has been a significant upgrade to risk register and review of implementation priorities, a further suggestion would be to continue developing the safety management system and the further development of the operations manual integrated with the upgrade of standard operating procedures integrated with the developments on site.	The RMB will consider how to integrate its OHS system and SOPs into the Drinking Water Risk Management Plan prior to the next audit period.	**Closed**	An updated drinking water quality risk register was provided for audit review. This risk register forms part of the overarching DWSMP sighted version 1 dated 17/4/2023. It has been in draft over the audit period. This is a new way of managing the DWSMP and risk register hence documents are version 1. The OFI is now closed.
2019_20 Reference – OFI - 5	It's also important to ensure hardcopy manuals, operational records, and inspection sheets are kept on-site in relevant document cupboards.	Documentation readily available within relevant cupboards.	**Closed**	The onsite audit activities sighted the document cupboards i.e. pump house building. This OFI is closed.
2019_20 Reference – OFI - 6	Suggest further research and training with your chlorine dosing company, Prominent. Some upgrades may be required, for example, a dosing tank, mixing chamber, and integration into SCADA Critical Control Points and other alarm protocols. Dosing chlorine where there are very low water flows represent a technical challenge and also risk. It was encouraging to note the follow up with Milestone Chemicals on chlorine compliance documentation and procedures.	A review of the chlorine dosing system was undertaken during the 2020-21 reporting period (details noted in the Annual Report). Additional staff training will be considered.	**Closed**	MHAR has undertaken considerable work/actions to improve the emergency chlorine dosing system, to address low flow and high flow dosing requirements. After analysis of the data that was collected, the chlorine dosing point was relocated. This resulted in improved and consistent free chlorine residual results at the extremities of the drinking water distribution network. MHAR Water Operations personnel have relocated dosing point to ensure the network maintains an adequate chlorine residual at customer taps. Evidence sighted – documentation detailing the investigations and testing undertaken in relation to chlorine dosing improvements. MHAR has established and maintains a contractor relationship with two suitable qualified people to support their provision of chlorine dosing. Prominent and Yabbie Pond P/L. The OFI is closed
2019_20	It's also very encouraging to note that the low-level alarms have been	Alarms are operational. If tank levels drop below a set level, an SMS text	**Closed**	The OFI is closed.

Audit report period	Details	Actions (as communicated to DH by MHAR)	Status	Follow up – 18 April 2023
Reference – OFI - 7	installed on the clear water storage tanks.	message is sent to relevant water operational personnel.		
2017_2018 Reference – OFI - 1	Two of the old water storage tanks have reached the end of their economic life. Best practice is to replace them with concrete tanks with increased capacity.	Both tanks have been taken offline and decommissioned. Planning has commenced on one replacement tank.	**Closed**	Refer to comments provided for OFI 2019_20 Reference – OFI-2 above. Construction of the new 2.2mL concrete tank is budgeted and scheduled for the 2023/24 Summer construction program. The OFI is closed.
2017_2018 Reference – OFI - 2	SMS alarms for water tanks.	Alarms have been installed.	**Closed**	Refer to comments provided for OFI 2019_20 Reference – OFI-7 above. This OFI is now closed.
2017_2018 Reference – OFI - 3	The project to replace the rising main is a high priority. It is very important to budget for proactive replacement.	Critical stages completed, staged works ongoing. The upgrade of the rising main is a complex multi-year project that is occurring in areas of challenging alpine terrain. As such, staged annual replacement is ongoing, with further works to continue over summer 2021/22 when the site can be accessed.	**Open**	This summer period 22/23 was delayed due to weather conditions. As advised by MHAR this is a multi-year project and is a challenging project – the resources for infrastructure are on the ground ready to go when weather conditions allow work (sighted during audit) – This is very unique and challenging project due to the environment and terrain. This project has had a significant investment already. It is important to note the replacement of the raw water rising main is not a project to address a water quality safety risk. The completion of the project is to meet future water demand prediction as the Mount Hotham village continues to grow and develop.
2017_2018 Reference – OFI - 4	It is encouraging to note that there are some upgrades of the chlorine-dosing unit scheduled. Suggest manufacturer further develop and revisit the chemical dosing configuration, to improve it when there are low water flows.	Emergency chlorine dosing review completed. The RMB engaged independent consultant Zlatko Tonkovic (Yabbie Pond Pty Ltd) to undertake an investigation into the performance of the potable water emergency chlorine dosing system. This planning report provides an overview of the potable water system and existing chlorination system and presents options for complying with future requirements for continuous chlorination of the water supply. The RMB staff conducted a detailed performance review of the existing	Closed	Refer to comments provided for OFI 2019_20– OFI-6 reference above. This OFI is now closed.

Audit report period	Details	Actions (as communicated to DH by MHAR)	Status	Follow up – 18 April 2023
		chlorine residual levels which identified a disparity between chlorine residual levels between Hotham Central and Davenport sections of the reticulation. The data was reviewed and the reason for low readings in Hotham Central section and higher readings in Davenport was attributed to poor mixing of chlorine at the injection point, prior to entering the reticulation. Based on advice from Zlatko, the injection point was changed to a new position up stream of the UV reactor to promote thorough mixing of the chlorine (Sodium Hypochlorite) prior to entering the reticulation. A second round of testing was conducted, and uniform chlorine residuals were obtained. Sampling was conducted at lower flows and moderate flows to ensure continuity of chlorine residuals throughout the potable water supply reticulation over a range of normal operating conditions was conducted, and uniform chlorine residuals were obtained. Sampling was conducted at lower flows and moderate flows to ensure continuity of chlorine residuals throughout the potable water supply reticulation over a range of normal operating conditions.		
2017_2018 Reference – OFI - 5	Installation of record cupboard and equipment cupboards in the UV and pumphouse work area. a) It is very encouraging to note the further development of onsite inspection record sheets and that they are kept next to each relevant area. Suggest	Cupboards installed. The MHAR has committed to ongoing training of key water operations personnel.	**Closed**	Refer to comments provided for OFI 2019_20 - OFI-5 reference above. This OFI is closed.

Audit report period	Details	Actions (as communicated to DH by MHAR)	Status	Follow up – 18 April 2023
	that further training of operators to properly complete inspection record sheets is undertaken.			
2017_2018 Reference – OFI - 6	It is encouraging to note that drones are under review for inspection of catchments.	Drones were reviewed and deemed impractical for purpose.	**Closed**	April 2023 – the auditor accepts MHAR's assessment regarding budgetary constraints and the effectiveness of the current annual catchment survey program. MHAR commissioned a comprehensive drone survey of the drinking water catchment in January 2023, to support an emerging business initiative by a local indigenous enterprise. The OFI is closed.
2017_2018 Reference – OFI - 7	For your sampling taps, suggest considering a yearly audit, and replacement where required	In house audit undertaken and two (2) additional sample points have been installed.	**Closed**	The onsite audit activities in April 2023 confirmed the installation of additional sample points and the maintenance and inspection activities undertaken are sufficient. This OFI is closed.
2017_2018 Reference – OFI - 8	Consider as a priority extra sampling points as per your Risk Management Plan.		**Closed**	Refer to comments provided for OFI 2019_20 Reference – OFI-3 above. This OFI is closed.

ATTACHMENT 2 – WATER QUALITY POLICIES

Falls Creek Alpine Resort

Mount Hotham Alpine Resort

Mount Buller & Mount Stirling Alpine Resort

DRINKING WATER QUALITY POLICY

Version	Date approved:	Effective from:	Next Review:
5.0	15 August 2023	August 2023	August 2025

1. Scope

Alpine Resorts Victoria (t/a Mt Buller & Mt Stirling Alpine Resorts) is required to deliver safe drinking water by implementing & maintaining a drinking water quality management system consistent with the National Health & Medical Research Council's Australian Drinking Water Guidelines.

2. Objective

To ensure the provision of safe drinking water at Mt Buller, Mt Stirling and Mirimbah.

3. Policy

- The safety, needs & expectations of consumers are paramount and will drive our approach to water quality and planning.
- Water quality will be effectively managed at all points along the delivery chain from catchment to consumer.
- The quality of drinking water will be effectively monitored & reported to provide relevant & timely information and promote confidence in the water supply and its management.
- A risk-based approach will be used to identify & mitigate potential threats to water quality, including appropriate contingency planning and incident response.
- Water management practices will be regularly assessed against legal requirements and contemporary industry practices.
- ARV will retain an understanding of contemporary drinking water issues and management by remaining informed and involved regarding industry regulations, guidelines, research and other standards relevant to public health.
- All ARV staff will remain alert for any potential concerns or issues regarding water quality and report these to the Mt Buller & Mt Stirling Chief Operating Officer or Head of Assets and Operations.

4. Roles / Responsibilities

- All ARV staff are responsible for compliance with this policy.
- The Head of Assets and Operations is responsible for water quality and for reviewing this policy.

5. Other References & Related Documents

- Safe Drinking Water Act 2003
- Safe Drinking Water regulations 2015
- Safe Drinking Water Risk Management Plan for Mt Buller, Mt Stirling and Mirimbah (V8, 5 July 2023)

BOARD POLICY 1.30
Safe Drinking Water

Falls Creek Alpine Resort Management Board ('the Board')

1. Purpose

This Policy demonstrates the Board's commitment to providing high quality drinking water to Falls Creek Alpine Resort in accordance with the *Safe Drinking Water Act 2003*.

2. Definitions

Act – *Safe Drinking Water Act 2003*

ADWG – Australian Drinking Water Guidelines

Board – Falls Creek Alpine Resort Management Board

FCRM – Falls Creek Resort Management - a business name registered by the Board to refer to its operational structure

Resort – Falls Creek Alpine Resort

3. Scope

This policy applies to all Board members, managers, staff, contractors and other personnel responsible for provision of safe drinking water to the Resort.

4. Policy Statement

As a gazetted Victorian Water Agency, the Board is committed to ensuring the Resort water quality is at all times compliant with the Act.

To achieve this, the Board will provide sufficient resources and support to:

i. comply with legislative requirements with regard to the Act and any associated regulations;
ii. put in place systems to identify and manage the risks associated with Board water supply operations;
iii. provide high quality water to the Resort;
iv. protect employees, public and visitors from harm;
v. consult with relevant FCRM managers and employees about water quality;
vi. train FCRM employees to improve water supply operations; and
vii. continually improve the Board's water supply infrastructure and operations.

5. Responsibility

Provision of safe drinking water is a shared responsibility of the Board members, managers, supervisors, employees, volunteers and contractors of the Board.

The Board is responsible for ensuring compliance with the Act.

The **CEO** is responsible for the implementation of this policy.

Organisational Directors, Managers and Supervisors are responsible for:

a. ensuring the water quality and supply operations are adequately controlled;
b. completion of mandatory performance reporting;
c. notifying and investigating non-conformances;
d. implementing continuous improvement programs; and
e. undertaking the required asset improvement and investment programs.

Employees, Volunteers and Contractors are responsible for:

a. following required operational procedures;
b. completing the required training programs;
c. ensuring monitoring, documentation and data logging is completed appropriately; and
d. providing feedback to management on water quality performance.

6. Policy Review

This policy will be reviewed every 3 years, or more frequently as required.

7. Key legislation, regulations and standards

Safe Drinking Water Act 2003

Safe Drinking Water Regulations 2015

Authorisations and Document Parameters

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HOTHAM
Mount Hotham Alpine Resort Management

Policy name: Mt Hotham Drinking Water Quality Policy

Owned by: Technical Services and Environment

Policy number: TES002

Why we have this policy

The purpose of this policy is to set out the approach and commitment of the RMB to provide reliable delivery of safe drinking water that meet customer needs and contributes to the ongoing viability of the resort.

The RMB will supply its customers with drinking water that satisfies the requirements of the *Safe Drinking Water Act (2003)* and Safe Drinking Water Regulations (2015) and seek to meet our customer expectations for drinking water quality. Through this policy, the RMB will support our vision "to establish Mt Hotham as a lead regional tourism destination with a thriving year-round economy, delivered within an environmentally sustainable framework".

The drinking water quality objectives are:

- To meet, or exceed, Standards for water quality, environmental protection and customer service,
- To manage risk responsibly,
- To ensure informed decision making based on reliable available data,
- To support growth and development in our customer base,
- To ensure the environment is protected.

Who and what does this policy apply to?

This policy applies to all RMB employees, suppliers and contractors responsible for the management, operations, maintenance and monitoring of our drinking water supply network.

Key Principles

To implement this Policy, the RMB will adopt the following approach, in partnerships with stakeholders and relevant agencies:

- Utilise a risk-based approach in which potential impacts on water quality, from catchment to tap, are identified and mitigated,
- Ensure high raw water quality by protecting the health of the Upper Swindlers catchment and waterways through effective partnerships with stakeholders and relevant agencies,
- Provide high quality drinking water through operational monitoring, sampling and process control measures,
- Maintain appropriate contingency planning and incident response systems and reporting,
- Maintain drinking water quality expertise and capabilities through professional development opportunities for staff,
- Publish the results of the drinking water quality with Annual Reports and respond to customer enquiries in a timely manner,
- Participate in industry forums dealing with drinking water quality and keep abreast of developments in drinking water quality research and management,
- Continually improve practices by assessing performance against corporate objectives and stakeholder expectations.

Responsibilities

The Board is responsible for overseeing the implementation of the policy.

The Executive Leadership Team (ELT) is responsible for incorporating the RMBs drinking water quality responsibilities into business planning and operational activities.

The Director, Technical Services and Environment is responsible for directing, reviewing and reporting upon the implementation of the Drinking Water Quality Policy and Mt Hotham Drinking Water Risk Management Plan.

Senior Managers and staff involved in the supply and monitoring of drinking water are responsible for understanding, implementing, maintaining and continuously improving the drinking water quality risk management system.

Associated key documents

- *Safe Drinking Water Act (2003)* and Safe Drinking Water Regulations (2015)
- Australian Drinking Water Guidelines (updated November 2018)
- Mt Hotham Drinking Water Risk Management Plan
- Mt Hotham Annual Drinking Water Annual Reports
- FIN017 Asset Management Accountability Policy

Policy Review Register

Date created	April	2021
Review frequency	Every 2 years	
Last reviewed	April	2021
Next review	April	2023
Review responsibility	Technical & Environmental Services Director	
Approval responsibility	CEO	
Approved by	Board Chair	