

DRINKING WATER ANNUAL REPORT



2021



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Introduction

Purpose

This annual report has been produced in order to comply with the requirements of the *Safe Drinking Water Act 2003* (the Act) and the Safe Drinking Water Regulations 2015 (the Regulations). This Drinking Water Annual Report provides information on the quality of drinking water provided to Mount Hotham Resort from July 1st 2020 to June 30th 2021.

Mount Hotham Alpine Resort

Mount 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. Mount 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 urban area within the resort supports administrative, retail and commercial business as well as a large variety of accommodation. There are approximately 4,300 beds within the resort. The village population, and consequent demand for water, is highly seasonal. At the 2016 census, Hotham Heights recorded a permanent population of 196. There were **39**,149visitor days recorded during the 2020 winter season. Visitation was severely reduced due to Covid-19 restrictions, In contrast 367,045 and 398,125 were recorded in 2019 and 2018 respectively. The Mount Hotham Alpine Resort Management Board (RMB) is the statutory authority under the *Crown Land (Reserves) Act* 1978, and the *Alpine Resorts (Management) Act* 1997. *The Alpine Resorts (Management) Act* 1997 states the RMB is to provide services within the resort including water supply.

Drinking Water Objective

RMB strives to provide the delivery of quality reliable services that meet customer needs and contributes to the ongoing viability of the resort. RMB is defined as a water supplier under the Safe Drinking Water Act 2003 and aims to provide a high quality safe drinking water supply.

Overview

Water supply system Table 1. Source of water

Water Sampling Locality	Population supplied	Source Water	Storage	Treatment Plant
Mount Hotham	October to May less than 100, June to September approx. 4800.	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 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 Mount Higginbotham. From the storage tanks, the raw water flows to the ultra violet (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 schematic overview is shown in Figure 1. The key components of the water supply system are detailed in Figure 2.



Figure 1. Schematic overview of water supply system.



Figure 2. Key components of the drinking water supply system within the Mount Hotham Alpine Resort.

Storage Weir

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 a 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 Mount Higginbotham.

The rising main steel pipeline was constructed in 1972 and has been highlighted for replacement within the RMBs Asset Management Systems. RMB commenced staged replacement of the rising main in 2019 and is committed to ongoing staged works to complete full replacement of the ageing pipeline. Priority has been given to initially replace the high pressure section of the pipeline between the pump station to the top of Sun Run area. The mains installation to Stage 1 (Sun Run) is complete with Stage 2 (Lower Playground) approximately 50% completed. The RMB are working to commission the high pressure section of the main by December 2022.

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 storage

Five storage tanks with a total capacity of 2.56 megalitres are located on Mount Higginbotham. The five storage tanks are de-silted on a rotating basis and cleaned every 3-4 years.

Treatment

The stored raw water flows to one of two UV facilities for disinfection before entering the reticulation system to be supplied to consumers. Two high intensity medium pressure UV lamp chambers exist. UV 2 is the primary disinfection system used while UV 1 provides additional capacity, maintenance and redundancy.

In the event of an interruption to mains power supply at the main UV 2 unit 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:

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

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 2020-21 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.

Monitoring and Reporting

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 drinking pump house, Mount 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 Mount Higginbotham storage tanks record water storage levels.

Monitoring within 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 the RMB Technical Services office.

The SCADA system further enhances the RMB'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.

The RMB also undertakes regular water sampling to monitor 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 designated consumer tap points throughout the resort. These samples are also tested for coliforms and plate counts. Monthly sampling is also taken from the raw water weir and immediately prior to UV treatment for *E. Coli*, coliforms and plate count. Samples are analysed by an independent accredited laboratory. The water sampling results are discussed in the RMB's annual report on drinking water quality, which is submitted to the Department of Health each year. Long term water quality sampling results from the Mt Hotham locality are available back until 1993.

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. The RMB implemented regular Trihalomethane monitoring in April 2021 to ensure compliance with the Regulations. Initial results obtained between April and June 2021 are presented in the Water Quality Standards section of this report.

The raw water supply 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 Mount Hotham drinking water catchment and supply, and

supported by long term monitoring of microbial hazards of both raw water and post treatment water quality testing, it was deemed not necessary to conduct regular monitoring for other pathogens, chemicals, substances or algae as risk is considered low.

Source Water

The Safe Water Drinking Regulations 2015 requires water suppliers to quantify microbial hazards within risk management frameworks to demonstrate an understanding of source water risks.

The source of the Mount Hotham locality 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. A number of small tributaries deliver reliable flows to Swindlers Creek for most of the year and flows are significantly augmented during rain events.

In accordance with recommendations of the WSAA Drinking Water Source Assessment and Treatment Requirements outlined in the Manual for the Application of Health-Based Treatment Targets (September 2015), the RMB conducted a sanitary survey and vulnerability assessment of Upper Swindlers catchment. The 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 at May 2016; and
- Locked gates to tracks to prevent recreational vehicle access.

The Category 1 Source classification further considered and confirmed against a microbial indicator assessment. Monthly raw water monitoring has been conducted since 1993 with sampling points at the on stream storage weir, Mt Higginbotham storage tanks and prior to disinfection within the UV 2 facility for *E.coli*, coliforms and plate counts. This allows for long term comparisons for pathogen levels within the on stream, off stream and treatment facilities.

Recently constructed in 2016, a new inlet structure with headwall resulted in an approximate 3 megalitres of instream raw water storage capacity with an additional detention time, thereby further reducing the risk of pathogens within the source water.

Results from the raw water monitoring program have verified the effectiveness of the increased detention time within the off-stream storage to reduce pathogen occurrence. Regular raw water monitoring provides operational staff an early warning indicator of potential issues within the catchment to inform overall catchment health.

Drinking Water Treatment Processes

Water treatment

Table 2. Water treatment processes

Water Sampling Locality	Treatment Process	Added Substance
Mount Hotham	UV	NIL
	(chlorination upon UV disinfection failure)	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 UV1 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. The RMB has an emergency chlorine dosing system the activates upon UV disinfection failure.

During the 2018 audit, an OFI suggested to further develop and revisit the chemical dosing configuration, to improve it when there are low water flows. In response to this OFI and during the 2020-2021 reporting period, the RMB engaged 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 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 was conducted at lower flows to ensure continuity of chlorine residuals throughout the potable water supply reticulation over a range of normal operating conditions.

Issues

There have been no issues identified with the drinking water treatment and supply system within the July 2020 to June 2021 reporting period.

Emergency, Incident and Event Management

The Regulations require information, actions and issues relations to emergencies, incidents and management of drinking water quality by a water supplier. Examples would include *E.Coli* detections, boil water advisories, critical control point breaches or treatment failures.

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 2020-21 reporting period. There were also no incidents that had the potential to impact on water quality during the 2020-21 reporting period.

Drinking water quality standards 2020-2021

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 designated consumer tap points throughout the resort. Monthly sampling is also taken from the instream raw water supply weir and 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 source 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 RMB was found to be 100% compliant with the *E. coli* water quality standard during the 2020-21 reporting period (Table 3).

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)
Mount Hotham	Weekly	52	0	0	0

Table 3. *E. coli* detections of drinking water for the locality of Mount Hotham between July 2020 and June 2021.

Trihalomethanes

The RMB implemented monitoring for Trihalomethanes in April 2021. 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. The Trihalomethane testing results as presented in Table 4 are reflective of the lack of chlorine in the supply system.

Table 4. Total Trihalomethanes results of drinking water samples collected for the locality of Mount Hotham between July 2020 and June 2021.

Water sampling locality	Frequency of sampling	Number of samples	Drinking water quality standard (mg/L)	Maximum (mg/L)	Average (mg/L)	No of investigations where standard not met (s.18)
Mount Hotham	Monthly	3*	0.25	<0.001	<0.001	0

* Sampling for Trihalomethanes commenced in April 2021 and as such only 3 samples were recorded for the reporting period July 2020 to June 2021.

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). The Mt Hotham locality has very high-quality raw water with usually low turbidity due to the pristine nature of the source catchment. Mt Hotham met the turbidity water quality standard during the 2020-21 reporting period (Table 5).

Number of 95th Maximum 95th Water percentile of results Max turbidity Frequency of Number of percentile of turbidity sampling in a sample in any 12 months sampling samples results in any 12 locality (NTU) above standard months (NTU) (s.18) Mount 52 0.2 0 Weekly 1.5 Hotham

Table 5. Turbidity results for drinking water for the locality of Mount Hotham between July 2020 and June 2021.

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; the RMB 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 the raw water supply weir is not subject to algal blooms due to cool temperatures, low nutrient load and generally strong water flows. More details can be found under the "Monitoring and Reporting" section within this report.

Aesthetic characteristics

Aesthetics parameters including iron, hardness and colour are not formally assessed at Mount Hotham. The RMB, as the water supplier, has determined that it is appropriate that no 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 Mount Hotham water locality.

Analysis of results

The RMB has been compliant with the water quality standards for over seven years. Results for the past three reporting periods are presented below (Table 5). The RMB 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 Mount Hotham Resort. 100% of samples collected and analysed during the 2018-19, 2019-20 and 2020-21 reporting periods met the standards for *E.coli* and turbidity.

	E. coli		Tu	rbidity	
Year	No of samples containing <i>E.coli</i>	% of samples with no <i>E.coli</i>	Max NTU	95 th percentile	Compliance with standards?
2018-19	0	100	0.3	0.2	Yes
2019-20	0	100	0.3	0.2	Yes
2020-21	0	100	1.5	0.2	Yes

Table 6. Comparison of water quality parameters for 2018-19, 2019-20 and 2020-21.

Complaints relating to water quality

The RMB did not receive any complaints relating to its drinking water quality or supply during the 2020-2021 reporting period nor for the previous five reporting periods. The RMB's water treatment processes and systems continue to result in quality water supply to the Mount Hotham Resort.

Risk Management Plan audit results

The Secretary to the Department of Health Services required RMB to undertake an audit of their risk management plan for the period between 10th April 2018 and 3rd August 2020. The RMB undertook the drinking water risk management plan audit in April 2021. The RMB's Drinking Water Quality Risk Management Plan was found to comply with the obligations of section 7(1) of the Act. A number of opportunities for improvement (OFI's) were suggested by the auditor. They are outlined in the table below.

OFI	Actions	Status
Undertaking 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.	Completed.
Also, a high priority is the upgrade of the old clear water storage tanks; suggest replacing with new modern tanks with increased capacity.	Tanks decommissioned. Planning commenced on design and approvals.	Ongoing. Funding required.
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 Loch/Heavenly Valley toilets will be considered.	December 2022
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	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.	December 2022

procedures integrated with the developments on site.		
It's also important to ensure hardcopy manuals, operational records, and inspection sheets are kept on-site in relevant document cupboards.	Documentation in readily available within relevant cupboards.	Completed.
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, see the Drinking Water Treatment section of this report for further details. Additional staff training will be considered.	Review Completed. Training ongoing.
It's also very encouraging to note that the low-level alarms have been installed on the clear water storage tanks.	No follow up required.	N/A

Risk Management Plan audit certificate



Regulation 10

Schedule 1 - Risk Management Plan Audit Certificate

Safe Drinking Water Regulations 2015

Certificate Number: 170

Audit Period: 10th April 2018 to 3rd August 2020

To: Mr Mick Cherry Mount Hotham Resort Management Board P.O.Box 188 Bright Vic 3741

Australian Business Number (ABN): 39 938 780 598

I, Thomas Teunissen, after conducting a risk management plan audit of the water supplied by Mount Hotham Resort Management Board, am of the opinion that:

Mount Hotham Resort Management Board has complied with the obligations imposed by Section 7(1) of the *Safe Drinking Water Act 2003* during the audit period.

Date: 18th August 2020

Signature of approved auditor:

Tom Tennisen.

Thomas Teunissen

Level 27 101 Collins St. Melbourne VIC 3000. Level 29, Chifley Tower, 2 Chifley Square, Sydney, NSW 2000 Mobile: 0410 624 604 Tel: 1300 899 237 Fax: 03 864 00 581 Email: tom@rmpsystems.com.au

Undertakings under section 30 of the Act

The RMB does not have any undertakings in place with the Department of Health and Human Services.

Variations, Exemptions and Regulated water

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

The RMB does not have any exceptions from water quality standards.

The RMB does not supply regulated water supplies that are not intended for drinking.

Further Information

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

Mount Hotham Alpine Resort Management Board

PO Box 188, Bright VIC 3741 Ph: (03) 5759 3550 Email: <u>mhar@mthotham.com.au</u>