



Mount Hotham Alpine Resort Management Board

Drinking Water Annual Report 2014-2015



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Mt Hotham Alpine Resort Management Board

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1. Introduction

Purpose

This annual report has been produced in order to comply with the requirements of the *Safe Drinking Water Act 2003*, *Safe Drinking Water Regulations 2005* and in accordance with the Department of Health & Human Service's revised 2014-15 Annual Report Guidance Note.

Mount Hotham Alpine Resort

The 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 that are incised by steep watercourses and gullies. The resort is located along the main ridgeline, at the headwaters of four major river catchments, the Kiewa, Mitta Mitta, Dargo (Mitchell) and Ovens.

The average total annual precipitation, including snowfall and rainfall is 1494 millimetres. Snowfalls occur on an average of 75 days annually and thunderstorms with high intensity rainfall are prevalent in spring and summer. The snowline for the resort is approximately 1400 meters asl and the average maximum snow depth is 1.5 metres at 1845 metres asl. Snowfalls that create and maintain a persistent snow cover usually begin about mid-June and continue intermittently until early September.

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 ski field is approximately 320 hectares or 11% of the total Resort area and is located between 1460 and 1861 meters asl.

The urban area within the resort supports administrative, retail and commercial business as well as a large variety of accommodation. There are approximately 4300 beds within the resort. The village population, and consequent demand for water, is highly seasonal. At the 2011 census, Hotham Heights recorded a permanent population of 161. 332,281 visitor days were recorded during the 2014 winter season; 264,527 and 411,495 recorded during were recorded during 2013 and 2012 respectively. The Mount Hotham Resort Management Board (MHARMB) 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 MHARMB is to provide services within the resort including water supply.

Drinking Water Objective

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

1.1 Characterisation of the System

Overview

Water is sourced from upper Swindlers Creek, a catchment of approximately 177 hectares. Water is collected at the Swindlers Weir and raw water is gravity fed 268 meters to the pump station, from here it is pumped through a 150 mm steel cement lined 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.

Table 1. Overview of system

Element	Description	Key Information
Source of Water	Upper Swindlers watershed	Limited development and human impact
Storage Weir	Swindlers Weir, upper Swindlers Creek	0.5 megalitre, raw water storage
Headworks	Pump house and Rising Main	Pre screen filters, turbidity monitoring
Raw Water Storage	Mount Higginbotham Tanks	Five tanks with 2.56 megalitre capacity
Treatment	UV 1 and UV 2 facilities	UV disinfection and emergency chlorine dosing at UV 2
Reticulation	Davenport and Village areas	Davenport linear main and Hotham Central ring main

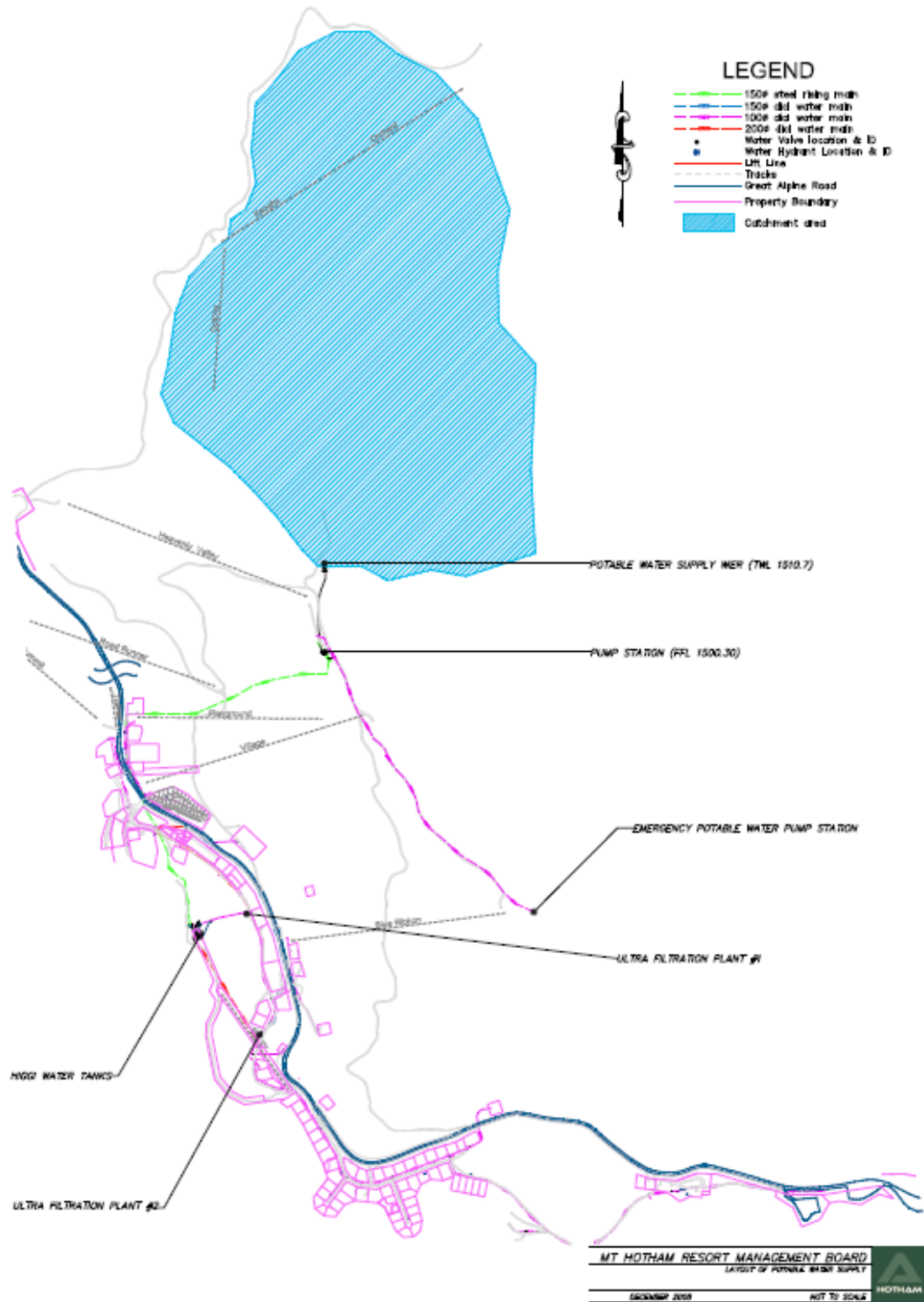


Figure 1. Key components of the potable water supply system within the Mount Hotham Alpine Resort.

Source of Water

The source of the village water supply is the upper reaches of Swindlers Creek. The upper Swindlers Creek watershed is a semi-closed catchment comprising groundwater source, snow melt and precipitation within a 177 hectares area (Foresight Engineering, 2011) at an altitude of approximately 1800m. A number of small tributaries deliver reliable flows to Swindlers Creek for most of the year and flows are significantly augmented during rain events.

Table 2. Source of water

Water Sampling Locality	Water Source	Storage	Treatment Facility	Population supplied
Mount Hotham	Upper Swindlers	Mt Higginbotham	UV 1 or UV 2	Seasonal

Storage Weir

Swindlers Creek flows through Swindlers Weir. The weir has a volume of 0.5 megalitre and is accessible via an access track for maintenance works.

Improvements undertaken during the reporting period to enhance the system included refurbishment of the potable water suction pipe between the raw water weir and pump house. An existing deteriorated 225mm UPVC pipe was removed as required as a component of the replacement of the Swindlers Creek Drainage Pipe Project. The MHARMB is now able to verify the quality and integrity of the potable water suction pipe in its entirety.

Headworks

The pump station houses two Dresser multi-stage vertical turbine pumps with two Osna 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.

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.

Raw water storage

Five storage tanks with a total capacity of 2.56 megalitres are located on Mount Higginbotham. The tanks have varying capacity, 1.2 megalitre tank, 0.75 megalitre tank 0.45 megalitre tank and two 0.081 megalitre tanks. The five storage tanks are de-sludged 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 potable water supply occurs. The automated system is made up of the following elements:

- FG Wilson P22E2 20KVG diesel generator,
- ATI 63 auto change over switch,
- Prominent Delta dosing pump,
- An uninterruptible power supply unit.

In conjunction with the SCADA, the system provides a transitional power supply and immediate “startup” 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 2014-15 reporting period as well as maintenance to other system elements.

Reticulation

All potable 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.

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 potable water supply system.

The SCADA system is linked to the Swindlers Weir, the potable 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 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 technical services office.

The SCADA system further enhances the MHARMB's ability to manage and operate its potable 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 *Safe Drinking Water Regulations 2005*.

MHARMB 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 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 prior to UV treatment and results are annually reported to the Department of Health & Human Services.

Snowmaking

The snow making water reticulation is largely independent of the potable drinking water supply system. The majority 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 potable storage tanks. The SCADA system enables continual monitoring of water demand from snowmaking to ensure potable water supply is not compromised.

The snowmaking system in Heavenly Valley has been expanded to include Imagine and Milky Way ski runs. Snow melt in the Milky Way area may enter Swindlers Creek just above the potable 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.

2. Water treatment and quality management systems

2.1 Water treatment

Table 3. Water treatment

Water Sampling Locality	Treatment Process	Added Substance
Mount Hotham	UV	NIL
	chlorination upon UV disinfection failure	chlorine 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;
- Scheduled replacement of lamps and sleeves.

These 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.

2.2 Issues

There have been no issues identified within the July 2014 to June 2015 reporting period.

3. Quality of drinking water for 2014-2015

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 prior to UV treatment. Collected samples are then couriered to an 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 on going awareness of raw water quality and to provide an early warning of any contamination that may have arisen within the catchment.

3.1 *Escherichia coli*

3.1.1 Results

No samples taken within the reporting period were found to contain *E. coli*; MHARMB were compliant with the *E. coli* water quality standard during 2014-15 reporting period.

Table 4. *E. coli* results.

Water sampling locality	Sampling frequency	No of samples	No of samples containing <i>E. coli</i>	Maximum result (orgs/100mL)	% samples with no <i>E. coli</i>	Complying (yes/no)
Mount Hotham	Weekly	52	0	0	100%	yes

3.1.2 Actions in relation to non-compliance

None

3.2 Chlorine based disinfection by-product chemicals

Chlorine is not used on a regular basis at Mount Hotham, therefore chlorine disinfection by-products are not monitored. Chlorine is only used to disinfect drinking water as an emergency back up when the UV lamps are not able to be used.

3.3 Ozone based disinfection by-product chemicals

Ozone disinfection is not used at Mount Hotham, therefore ozone disinfection by-products are not monitored.

3.4 Aluminium

Aluminium is not in used in the drinking water treatment process at Mount Hotham, therefore acid soluble aluminium is not monitored.

3.5 Turbidity

Table 5. Turbidity results.

Water sampling locality	Sampling frequency	No of samples	Max NTU	95% UCL of mean	Complying (yes/no)
Mount Hotham	Weekly	52	0.5	0.1	Yes

Note: 95% UCL results of 5.0 NTU and greater are non compliant, 95% UCL results of 5.0 NTU and less are compliant.

3.5.1 Results

All results met the turbidity drinking water quality standard

3.6 Fluoride

Mount Hotham does not fluoridate its drinking water supply.

3.7 Other algae, pathogen, chemical or substance not specified above that may pose a risk to human health

Mount Hotham does not undertake any regular monitoring of algae, pathogens, or chemicals in the drinking water. Swindlers weir 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 Mount Hothams drinking water catchment and supply it was deemed not necessary to conduct regular monitoring for algae, pathogens or chemicals as the risk was considered to be very low.

3.8 Aesthetics

Aesthetics parameters including pH, iron, hardness and colour are not formally assessed at Mount Hotham. The source water is of very high quality and clarity and no aesthetic treatment is necessary.

3.9 Analysis of results

MHARMB have been compliant with the turbidity water quality standard for the last three reporting periods. The good quality raw water source has resulted in MHARMB continuing to deliver good quality, safe drinking water to the resort. 100% of samples tested during the 2012-13, 2013-14 and 2015-16 reporting period contained no *E.coli*.

Table 6. Comparison of water quality parameters for 2012-13, 2013-14 and 2014-15.

Year	<i>E. coli</i>		Turbidity	
	No of samples containing <i>E.coli</i>	% of samples with no <i>E.coli</i>	Max NTU	95% UCL of mean
2012-13	0	100	0.4	0.1
2013-14	0	100	0.5	0.1
2014-15	0	100	0.5	0.1

4. Emergency / Incident Management

There were no incidents that were reported to Department of Health & Human Services under section 22 of the Act within the 2014-15 reporting period.

The MHARMB conducted a pre-winter field exercise at both UV treatment reactors. A number of scenarios were put forward and tested. As a result, minor changes were implemented to further reduce the risk of loss of disinfection.

5. Complaints relating to water quality

MHARMB did not receive any complaints relating to water quality or supply in the 2014-2015 reporting period.

6. Findings of the most recent risk management plan audit

Regulatory audits were not required to be undertaken during the 2014-15 reporting period.

7. Undertakings under section 30 of the Act

MHARMB do not have any undertakings in place with the Department of Health & Human Services.

8. 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: mhar@mthotham.com.au