

ANNUAL REPORT

2007-2008

DRINKING WATER SUPPLY

MT BULLER AND MT STIRLING

ALPINE RESORTS



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## INTRODUCTION

### 1. Aim

This report is the 2007 – 2008 Annual Report for the Provision of Drinking Water by the Mount Buller and Mount Stirling Alpine Resort Management Board. It has been prepared in accordance with Section 26 (1) and Section 26 (2) of the Safe Drinking Water Act 2003; Regulation 15 of the Safe Drinking Water Regulations 2005, 2006/2007 Department of Human Services Annual report format. and the 2007/08 Annual Report Format. The aim of the report is to provide information on the issues relating to the quality of drinking water and regulated water that are specified by the Safe Drinking Water Regulations 2005. The report is provided to the secretary of the Department of Human Services and is available to the public.

### 2. Mt Buller and Mt Stirling Alpine Resorts

The Mount Buller and Mount Stirling Alpine Resort Management Board (ARMB) is a State Government Agency established in accordance with the Alpine Resorts (Management) Act 1998 and is responsible for the management of the Mt Buller and Mt Stirling Alpine Resorts. The ARMB is responsible for providing a wide range of services to the resorts including drinking water treatment. Prior to 2003, there was no formal recognition of the ARMB as a water authority. The Safe Drinking Water Act 2003 recognised the role of the ARMB as a drinking water provider and defined the ARMB as a water supplier.

The Mt Buller Alpine Resort is a well developed Alpine Resort located approximately 220 km from Melbourne and centred on Mt Buller. Within the resort is the Mt Buller Alpine Village, positioned at 1,600 m elevation (snow line is 1,200 m) and with a bed capacity of 7,800 bed spaces. During the snow season (Queen's Birthday long weekend to the first weekend in October), there is a base population within the village of approximately 1,600. These people are generally resort workers and are considered as semi-permanent residents. The remaining bed spaces are occupied by transient visitors or are owned by non residents who generally visit the resort during holiday periods or on weekends. Average visitation to the resort during the snow season is in the order of 500,000 visitor days<sup>1</sup>. Peak visitation during the snow season occurs during school holidays and on weekends. The maximum number of people within the resort during any one day is in the order of 17,000 people.

In contrast, the non snow season population of Mt Buller is low. There are approximately 300 people who live in the Village during summer, these are made up of ARMB and Lift Company Staff, builders and construction workers and a small base of truly permanent residents (approximately 30). There are a number of activities held during the summer months that attract visitors; the biggest is the Mt. Buller Sprint which has recently been moved from the Australia Day long weekend to the Melbourne Cup long weekend. Generally there are approximately 200,000 visitor days during the non snow season.

Mt Stirling Alpine Resort has a common boundary (the Delatite River) with the Mt Buller Alpine Resort and is located to the northeast of the Mt Buller Alpine Resort. The resorts share Mirimbah as a common entrance point. In contrast to the Mt Buller Alpine Resort, the Mt Stirling Alpine Resort is a nature based resort and has no permanent population or accommodation. Development on Mt Stirling consists of a small office space for ARMB staff, a cross country ski outlet, a small food premises, temporary accommodation for ARMB ski patrol staff, a small industrial shed, several shelters / toilet blocks and three huts, two of which are privately owned

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1. A visitor day is the number of days a visitor stays within the resort. One visitor staying two days is two visitor days.

but are accessible and used by the public. Visitation to Mt Stirling Alpine Resort is generally by people seeking a nature based experience. During the snow season, visitors cross country ski and/or snow camp. Organised visits by school groups are common. Visitation is in the order of 7,000 visitor days during the snow season. During the non snow season, particularly during the December to February period, there are a significant number of visitors who pass through the Mt Stirling Alpine Resort in four wheel drive vehicles to access the nearby attractions, 'Craig's Hut', neighbouring state forests or the Alpine National Park. Camping within the resort is common. Traffic counts of vehicles entering the resort indicate that approximately 13,000 vehicles enter the resort during the non snow season.

The ARMB provides drinking water at 3 separate locations. They are as follows;

1. The Mount Buller Village;
2. The Mirimbah picnic area, traffic control and store;
3. The Mount Stirling Ski Patrol and store known as Telephone Box Junction.

The ARMB provides water at two huts within the Mt Stirling ski field via rainwater. This water is not intended for drinking and relevant signs are placed to warn people of this.

## MT BULLER VILLAGE – LOW and HIGH LEVEL SUPPLIES

### 3. Characterisation of the Mt Buller Drinking Water System

#### 3a. Source of water

Water for the Mt Buller Alpine Village reticulation system is drawn from up to three sources, Boggy Creek, the 'Head waters' and the 'Catchment Weirs'. The ARMB has a licence to draw up to 700 ML of water per year, the source of water is determined by the time of year based on the licence agreement with Goulburn Murray Water. During winter months when the demand is greatest all sources are available for use.

**Boggy Creek.** The Boggy Creek catchment is the northeast aspect of Mt Buller and is bounded by two spur lines running north (McLaughlan Shoulder and Burnt Hut Spur). The catchment is above 1,250 m elevation and is mainly covered in snow during the snow season. During the snow season, the water sourced from the catchment is either snowmelt, or groundwater. During summer the majority of water is ground water. The picture below is a view up the catchment.



Picture 1. Boggy Creek catchment

The picture above gives a good indication of the nature of the catchment from which the Mt Buller Alpine Village drinking water is sourced. The topography is steep and vegetated. The catchment lies in montane, sub alpine and alpine areas. There are few weeds or other exotic flora. Fauna consists of wild dogs, deer, wombat, wallabies and a range of bird life. The catchment is relatively inaccessible and is an area where vehicle access is controlled. There are several walking paths through the catchment. Camping is not permitted within the catchment.

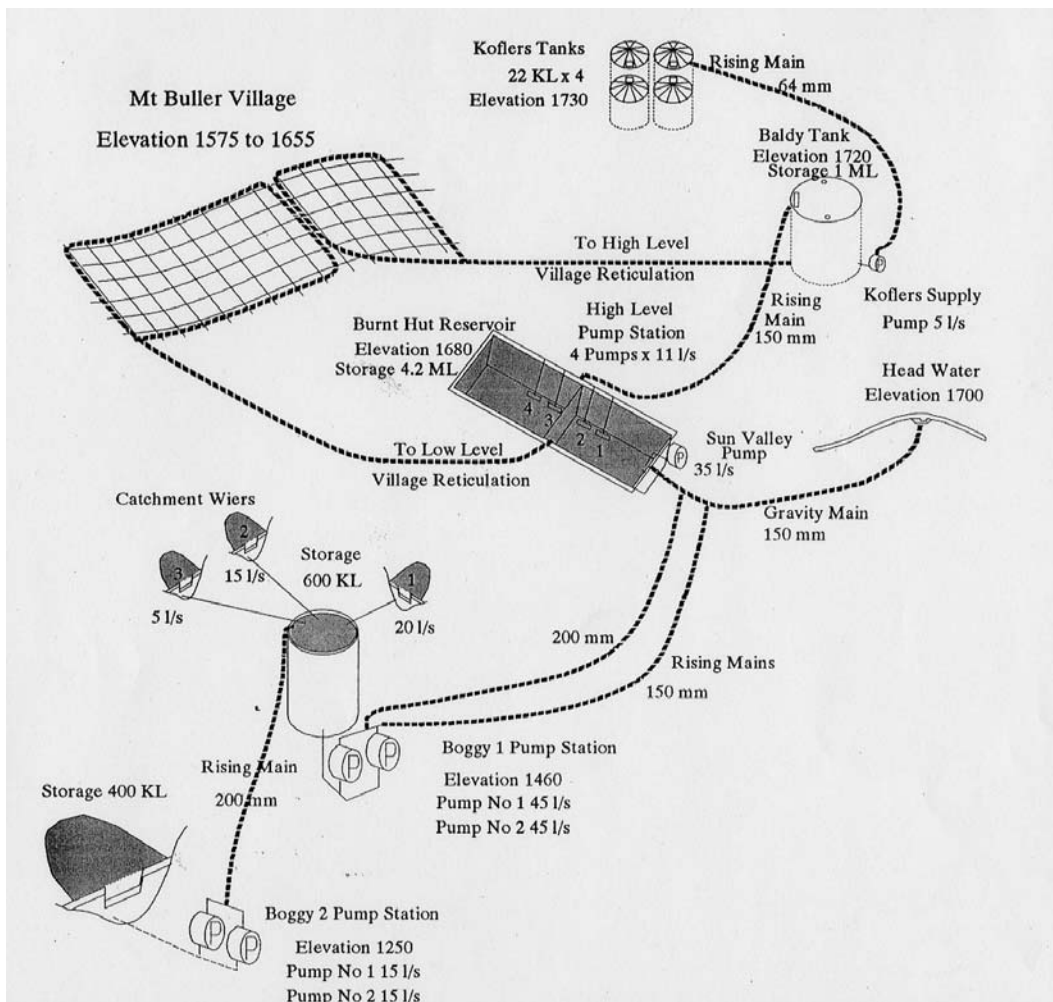
**Headwaters.** The headwaters are sourced from a side hill trench across the northeast aspect of Mt Buller. The trench is approximately 60 m long and at an elevation of approximately 1,780 metres. The trench collects water that has originated from alpine bogs.

**Catchment Weirs.** There are a number of small gullies within the vicinity of the catchment. These have small weirs across them and water is taken off to the reticulation system.

**Management.** The 'Headwaters' and 'Catchment Weirs' provide raw water at a higher elevation than Bogy Creek and are used when appropriate to minimise pumping costs. However the capacity of both these sources is significantly less than Bogy Creek. If there is sufficient capacity and raw water quality (primarily turbidity) is appropriate, the 'Headwaters' and 'Catchment Weirs' are used preferentially to Bogy Creek.

### 3b The Reticulation System

The schematic below depicts the Mt Buller Alpine Village water supply.



Schematic 1. Mt Buller Alpine Village Water System

The key factor that has influenced the development of the Mt Buller Alpine Village drinking water reticulation system is the elevation variation (approximately 100 m) within the Mt Buller Alpine Village. This change in elevation means that the reticulation within the village must be divided into two, and fed from reservoirs at different levels in order to keep the maximum water pressure within the reticulation below 1,000 KPa. Appliances such as hot water systems generally have a capacity in the order of 1,000 to 1,250 KPa.

Raw water is drawn from a weir on Boggy Creek and pumped (Boggy 2 pump) to an open 600KL holding tank. Raw water from the catchment weirs is gravity fed into the same tank. The raw water is then pumped (Boggy 1 pump) into the 4.2ML trapezoidal section open reservoir known as 'Burnt Hut Spur reservoir'. Water from the Headwork's is also gravity fed into the Burnt Hut Spur reservoir. This reservoir serves the low level reticulation within the Mt Buller Alpine Village. Water is drawn from the reservoir, irradiated with UV radiation and dosed with hypochlorite before being reticulated throughout the lower two thirds of the Village.



Picture 4. Burnt Hut Spur Reservoir

Water is pumped from Burnt Hut Spur reservoir to an underground 1 ML concrete tank reservoir known as 'Baldy reservoir'. Water from this reservoir is irradiated with UV radiation and dosed with hypochlorite, distributed (gravity fed) to the upper third of the Mt Buller Alpine Village, to Buller Ski Lifts Ltd (BSL) work shop facilities, to a public toilet located near the Sun Valley snow making dam and to 'Koffler's Hutte', a food premise locate in the ski field. The workshops are served by a rising main while Koffler's Hutte is served through a rising main to two storage tanks then gravity fed to the Hutte. The two storage tanks are half of a cluster of four tanks.

The ARMB provides non drinking water to BSL for use as feedstock water for snow making. This water is pumped from Burnt Hut Spur reservoir to the Sun Valley snow making dam though a rising main. This water is not for drinking and is not treated.

## **4. Water Quality Management**

### **4a Disinfection - Reg 15 (1) (h)**

The Mt Buller Alpine Village drinking water supply is disinfected using UV Irradiation at two sites, Burnt Hut Spur reservoir and Baldy reservoir. The UV systems are manufactured by Wedeco and are in line pressure systems. Each system has back up UV lamps in the reactor chamber, and a control system to manage the changeover to the back up lamp if the intensity of the first lamp falls below a nominated break point. Both systems are dosed with Hypochlorite using a flow based system with residual trim. Both systems where installed and maintained by C-Tech services. The chlorine residual is monitored daily via a web based system.

The power supply on Mt Buller is provided by a line main. The line is above ground until the boundary of the resort, and then is duplicated with a set of aerial lines, and below ground lines. The supply is susceptible to interruption caused by failing trees and similar environmental factors. Within the resort there a several large users of power, particularly the snow making system. Start up of the snow making system results in significant voltage drops. Each of the UV systems is fitted with a power conditioner designed to remove voltage spikes and drops, and a backup power supply (diesel generators).

During the reporting period an online flow paced with residual trim hypochlorite dosing system was installed on the high level system. This commenced in mid Aril 2008.

### **4b Management**

The ARMB operates a cyclic maintenance program for the reservoirs and reticulation. Every second summer, the reservoirs are emptied and silts removed. At least twice a year the reticulation is flushed to remove film build-ups.

It is planned to undertake a comprehensive air scouring project during the 2008/09 reporting period.

### **4c Chemicals - Reg 15 (1) (i)**

Hypochlorite is dosed into the drinking water as a means of disinfection. No other chemicals are used or introduced into the drinking water system

#### 4d Aesthetic Characteristics - Reg 15 (1) (j)

The raw water used for Mt Buller drinking supply is of a high standard and is monitored as an adjunct to the mandated weekly monitoring program. Retention in the Burnt Hut Spur and Baldy reservoirs provides an opportunity for suspended solids to settle out of the water before use.

Testing to date has identified that the water does not require treatment to meet the aesthetic standards.

The table below summarises the treatment processes for drinking water supplied by the ARMB to the Mt Buller Village and surrounding infrastructure.

Locality	Treatment Process	Added Substance	Comments
Mt Buller Low Level Reticulation	UV Irradiation Hypochlorite Dosing	Hypochlorite	Quality of raw water monitored is high.
Mt Buller High Level Reticulation	UV Irradiation Hypochlorite Dosing	Hypochlorite	Quality of raw water monitored is high.

**Table 1. Water Treatment and Added Chemicals.**

#### 4e Issues - Reg 15 (1) (h)

There are currently no issues associated with the Mt Buller High and Low Level Systems.

### 5 Water Quality for 2007/2008

As described in 'Characterisation of the System', the reticulation system within the Mt Buller Alpine Village is divided into two (known as the 'High Level reticulation' and the 'Low Level reticulation') in order to take into account the difference in elevation across the village. The snow fall within the village makes it impractical to sample from dedicated sample points located directly on the reticulation. Consequently, the sample points are all located in buildings. During the reporting period, the ARMB sampled from four sample points per reticulation level. Lodge and building closure during the non snow season months means that not all sample points were available all year round.

The contracted testing laboratory for water is Ecowise Environmental. Briefly the sampling process is as follows:

- Water sampled on Tuesday / Wednesday and placed in an insulated container with a freezer block.
- Samples couriered to the laboratory within 24 hours.
- Water tested. *E. Coli*, 37 deg plate and coliform counts reported by fax to the ARMB as soon as possible.
- Turbidity, coliform and 37 deg plate counts reported when known.
- Results confirmed by follow up letter.

Frequency of this testing was weekly.

Testing for Trihalomethanes, Chloroacetic acid, Dichloroacetic acid and Trichloroacetic acid where undertaken monthly.

## 5a *E. Coli*

A table summarising the results of *E. Coli* testing can be seen below.

Locality	No of Samples	Max (ORGS / 100 ML)	% with no <i>E.Coli</i>	Number of Compliant Samples	Complying (Yes/No)
High Level Reticulation	52	4	98.08	51	YES
Low Level Reticulation	52	0	100	52	YES

**Table 2. E. Coli Results**

The Safe Drinking Water Regulations require 98% of all samples to contain no E.coli to be in compliance.

## 5b Actions Undertaken In Relation To Non Compliance

During the reporting period there was one detection of E.coli in Mt Buller reticulation system. The detection was as listed below;

Date	Site	E.Coli Detected (ORGS / 100 ML)
07/11/07	Arlberg Hotel (High Level)	4

**Table 3. Positive E.Coli Readings**

All E.coli levels are reported as organisms/100ML of water. In accordance with Section 22 of the Safe Drinking Water Act, DHS were advised of the detections. Upon receiving notifications of E.coli detects disinfection systems were checked, mains were flushed and additional chlorine was added to the system.

## 5c Chlorine Based Chemicals

Chlorine (Hypochlorite) was dosed into both the high and low level systems. Testing for chlorine based compounds was carried out as required by the Safe Drinking Water Regulations 2005.

## Results

Results of Chlorine Testing can be seen in the table below

Locality	Chlorine byproduce	Frequency of Testing	No of Samples	Max mg/L	Min mg/L	Max* mg/L	Compliance (Yes/No)
High Level Reticulation	Chloroacetic Acid	Monthly	12	<0.005	<0.005	0.15	Yes
Low Level Reticulation	Chloroacetic Acid	Monthly	12	<0.005	<0.005	0.15	Yes
High Level Reticulation	Dichloroacetic Acid	Monthly	12	0.063	<0.005	0.1	Yes
Low Level Reticulation	Dichloroacetic Acid	Monthly	12	0.023	<0.005	0.1	Yes
High Level Reticulation	Trichloroacetic Acid	Monthly	12	0.042	<0.005	0.1	Yes
Low Level Reticulation	Trichloroacetic Acid	Monthly	12	0.021	<0.005	0.1	Yes
High Level Reticulation	Trihalomethanes	Monthly	12	0.150	0.002	0.25	Yes
Low Level Reticulation	Trihalomethanes	Monthly	12	0.067	0.016	0.25	Yes

**Table 4. Chlorine Residual Readings**

Both levels of reticulation comply with the Safe Drinking Water Regulators 2005.

\*Maximum levels under the Safe Drinking Water Regulations.

### 5d Ozone Based Chemicals

Ozone was not used during the reporting period to disinfect water within the Mt Buller Alpine Village.

### 5e Aluminium

Aluminium based compounds ('Alum') were not used as part of the treatment process within the Mt Buller Alpine Village.

## 5f Turbidity

Results of turbidity testing can be seen in the table below.

Locality	Frequency of Testing	No.of samples	Max (NTU)	Min (NTU)	95% UCL of mean*	Complying Yes/No
High Level Reticulation	Weekly	52	2.4	0.4	0.873	Yes
Low Level reticulation	Weekly	52	4.2	0.4	0.992	Yes

**Table 5. Results of Turbidity Testing**

\*95% UCL results of 5.0 NTU and greater are non compliant, 95% UCL results of 5.0 and less are compliant.

## 5g Actions undertaken in relation to non-compliance

Both levels of reticulation complied with the turbidity standards.

## 5h Aesthetics

Past years have seen spikes in turbidity levels, this has been particularly prevalent when large volumes of water are being drawn from the Burnt Hut reservoir for snow making. This reporting period has seen very few variances in the turbidity of the water.

This year the 95% UCL decreased 0.505 in the high level and 0.428 in the low level from last year.

## 5i Other algae, pathogen, chemical or substance not specified above that may pose a risk to human health

No testing for other substances was carried out during the reporting period. The raw water for Mt Buller is sourced from a region that is isolated. It is considered to be very unlikely that the Mt Buller Alpine Village is subject to contamination from chemical due to industrial fall out or farming practices. This was verified via a risk assessment that was carried out on the system.

## 6. Analysis of Results

### 6a Trends over time

Testing of source water has identified that background microbiological life within the source water is virtually zero during the snow season. During winter the raw water is sourced from snow melt and it is thought that the freeze thaw cycle provides a measure of disinfection. Ambient temperatures (commonly subzero) also inhibits the growth of microbiological life within the water. These two factors contribute to the low background microbiological life within the source water. During summer, the background count increases particularly during extended dry periods.

## **7 Emergency/Incident management**

### **7a Actions**

The ARMB has developed and implemented an emergency callout procedure. The procedure includes actions to be taken in case of interruption of supply, contamination or suspected contamination of the drinking water, and receipt of reports of poor quality water. In addition, the Resort Emergency Management Plan includes a risk assessment for either contamination or suspected contamination of water, and/or malicious sabotage of the water supply. The DHS were notified of any E.coli readings during the reporting period. Details of this can be found in section 5b of this report.

### **7b Issues**

While there have not been any threats to the drinking water supply in the past, the changed circumstances in Australia increase the likelihood of a threat or attack on the water supply. The ARMB continually reviews the security of the system and associated Emergency Management Plans.

## **8 Complaints**

### **8a Complaints and Responses**

During the reporting period there was no complaints received regarding any facet of the water supply or quality.

### **8b Analysis of Issues**

There are currently no issues requiring analysis.

## MIRIMBAH

The ARMB reticulates water sourced from Buller Creek near Mirimbah Park to a toilet block located within the park, the Traffic Control (ticket office) building, a small chain hire/service station and to an accommodation building used by Mt Stirling Ski Patrol staff.

### 9 Characteristics of Mirimbah Drinking Water System

#### 9a Source of Water

The water supply for Mirimbah comes from Buller Creek approximately 300 metres from the junction with the Delatite River at an elevation approximately 620 metres (below the snow line). The Creek is perennial and considered reliable.

#### 9b. The Reticulation System

Water is collected from the river using a small diversion channel (at the takeoff point the Creek is approximately 5 metres wide and 1.2 meters deep) and pumped into a shed for treatment. The collection point is adjacent to the parking area for staff vehicles and the picnic area.

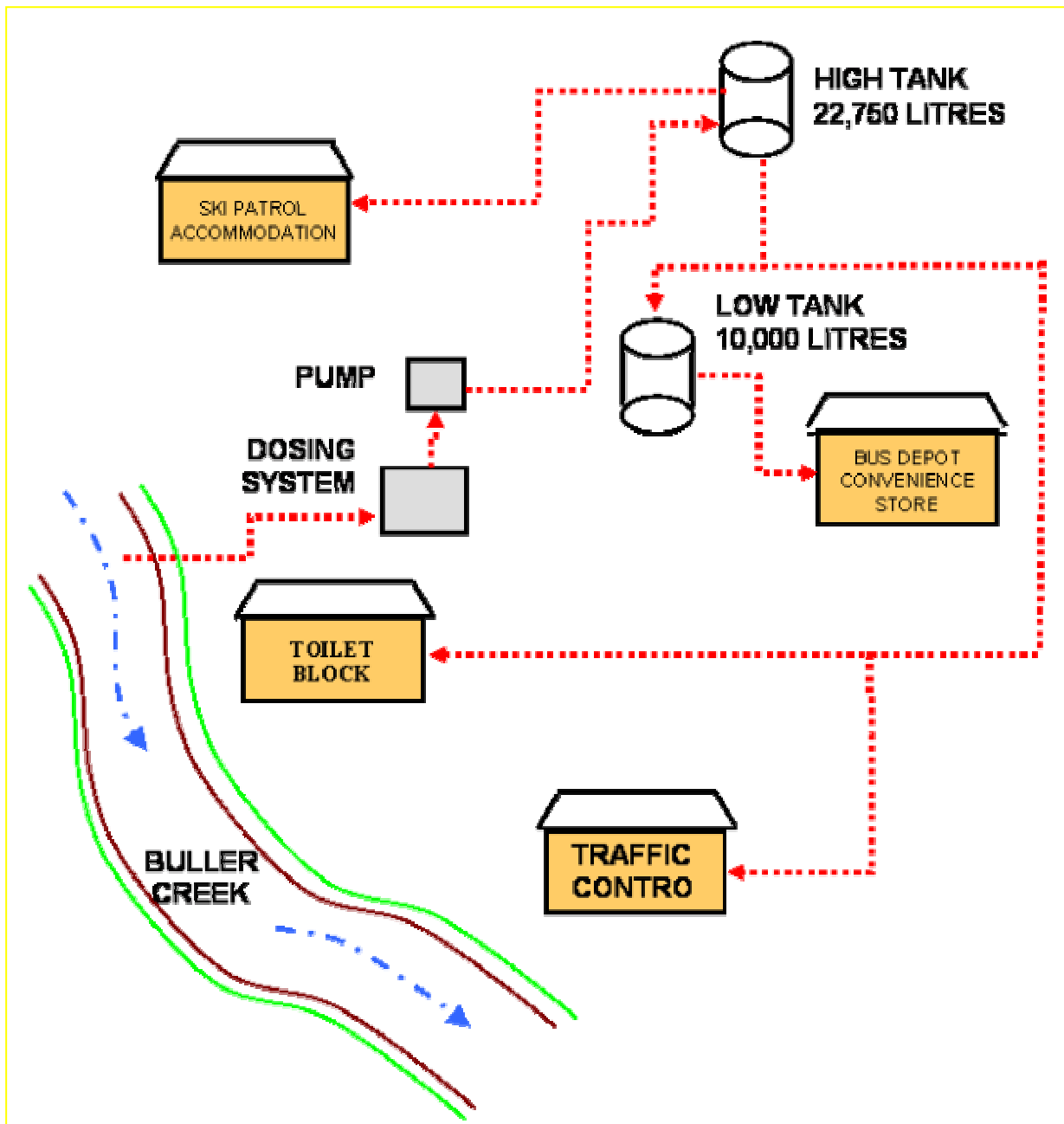
The treatment is performed using a system consisting of the following:

- 56 litres per minute capacity water pump;
- 0.5 litres per hour hypochlorite dosing pump;
- 200 micron mesh bag filter and
- 1 micron cartridge filter and a static mixer.

After dosing the water is pumped to a 22,750 litre elevated holding tank (approximately 60 metres higher than the Creek. Water is then gravity fed to the ski patrol accommodation (under the old bridge over the Delatite River), the ARMB traffic control building, public toilet block and a second 10,000 litre tank approximately 25 metres lower.

The second tank provides water to the Bus Depot and Convenience Store.

The schematic below depicts the Mirimbah water supply.



Schematic 2. Mirimbah Water System

## 10. Water Quality Management

### 10a. Disinfection

The Mirimbah water supply system is dosed with Hypochlorite by using a 0.5 litre per hour pump into the pumping line between the creek and the storage tank.

### 10b Management

The ARMB operates a cyclic maintenance program where the storage tanks are emptied and cleaned to remove any built up silt. The off take point from the creek is inspected weekly and cleaned when needed. The systems reticulated pipes are also flushed yearly.

### 10c Chemicals – Reg 15 (1) (i)

Hypochlorite is dosed into the drinking water as a means of disinfection. No other chemicals are used or introduced into the drinking water system.

### 10d Asthetic Characteristics – Reg 15 (1) (j)

The raw water used for the Mirimbah drinking supply is of a high standard and is monitored as an adjunct to the mandated weekly monitoring program.

The table below summarises the treatment processes for drinking water supplied by the ARMB to Mirimbah.

Locality	Treatment Process	Added Substance	Comments
Mirimbah	1 Micron Cartridge Filter Hypochlorite Dosing	Hypochlorite	Quality of raw water monitored is high.

**Table 6 Water Treatment and Added Chemicals.**

### 10e Issues – Reg 15 (1) (h)

The Mirimbah raw water is routinely monitored and is of high quality. It currently meets the aesthetic standards without further treatment.

## 11 Water Quality 2007/08

The process for collection of water samples and delivery for testing is the same as that of Mt Buller Low and High Level reticulation systems. Water samples during the reporting period were taken from three differing locations throughout the Mirimbah area.

### 11a E.coli

A table summarising the results of *E. Coli* testing is below.

Locality	No of Samples	Max	% with no <i>E.Coli</i>	Number of Compliant Samples	Complying (Yes/No)
High Level Reticulation	52	11	98.08	51	YES

**Table 7 E. Coli Results**

The Safe Drinking Water Regulations require 98% of all samples to contain no E.coli to be in compliance.

### 11b Actions Taken in Regard to Non Compliance

During the reporting period there was one detection of E.coli in the Mirimbah reticulation system.

Date	Site	E.Coli Detected (ORGS / 100 ML)
23/04/07	Mirimbah reticulation	11

**Table 8. Positive E.Coli Readings**

All E.coli levels are reported as organisms/100ML of water. In accordance with Section 22 of the Safe Drinking Water Act, DHS were advised of the detections. Upon receiving notifications of E.coli detects disinfection systems were checked, mains were flushed and additional chlorine was added to the system.

### 11c Chlorine Based Chemicals

Chlorine (Hypochlorite) was dosed into the system. Testing for chlorine based compounds was carried out as required by the Safe Drinking Water Regulations 2005.

Results

Locality	Chlorine byproduce	Frequency of Testing	No of Samples	Max mg/L	Min mg/L	Max* mg/L	Compliance (Yes/No)
Mirimbah Reticulation	Chloroacetic Acid	Monthly	12	<0.005	<0.005	0.15	Yes
Mirimbah Reticulation	Dichloroacetic Acid	Monthly	12	0.025	0.009	0.1	Yes
Mirimbah Reticulation	Trichloroacetic Acid	Monthly	12	0.042	<0.011	0.1	Yes
Mirimbah Reticulation	Trihalomethanes	Monthly	12	0.059	0.019	0.25	Yes

## 11d Ozone Based Chemicals

Ozone was not used during the reporting period to disinfect water at Mirimbah. No testing for Ozone was undertaken during the reporting period.

## 11e Aluminium

Aluminium based compounds ('Alum') was not used as part of the treatment process at Mirimbah. No testing was for Aluminium was undertaken during the reporting period.

## 11f Turbidity

Results

A table summarising the results of turbidity testing is below.

Locality	Frequency of Testing	No.of samples	Max (NTU)	Min (NTU)	95% UCL of mean*	Complying Yes/No
Mirimbah	Weekly	46 ^	4.3	0.3	1.148	Yes

**Table 9. Results of Turbidity Testing**

\*95% UCL results of 5.0 NTU and greater are non compliant, 95% UCL results of 5.0 and less are complaint.

## 11g Actions Undertaken in Regard to Non-Compliance

Nil

## 11h Aesthetics

The water at Mirimbah is currently of a very high quality.

## 11i Other Pathogen, Chemical or Substances Not Specified above that may pose a risk to human health

No testing for other substances was carried out during the reporting period. The raw water for Mirimbah is sourced from a region that is isolated. It is considered to be very unlikely that the Mirimbah water is subject to contamination from chemical due to industrial fall out or farming practices. This was verified via a risk assessment that was carried out on the system during the reporting period.

## **12 Analysis of Results**

### **12a Trends over time**

Since the implementation of the filtration and hypochlorite dosing system the waster at Mirimbah has tended to be of a very high quality. No further analysis has taken place.

## **13 Emergency / Incident Management**

### **13a Actions**

The ARMB has developed and implemented an emergency callout procedure. The procedure includes actions to be taken in case of interruption of supply, contamination or suspected contamination of the drinking water, and receipt of reports of poor quality water. In addition, the Resort Emergency Management Plan includes a risk assessment for either contamination or suspected contamination of water, and/or malicious sabotage of the water supply. During the reporting period there was no incidents requiring such actions.

### **13b Issues**

While there have not been any threats to the drinking water supply in the past, the changed circumstances in Australia increase the likelihood of a threat or attack on the water supply. The ARMB continually review the security of the system and associated Emergency Management Plans.

### **13c Complaints**

There have been no formal complaints made in relation to the drinking water at Mirimbah

## **MT STIRLING – TELEPHONE BOX JUNCTION (TBJ)**

The ARMB reticulates water to a toilet block, small ski hire and bistro and the ARMB ski patrol base.

### **14 Characteristics of the TBJ Drinking Water System**

#### **14a Source of Water**

The water supply for Mt Stirling comes from Baldy Creek approximately 150 metres upstream from the TBJ building. The Creek is perennial and considered reliable.

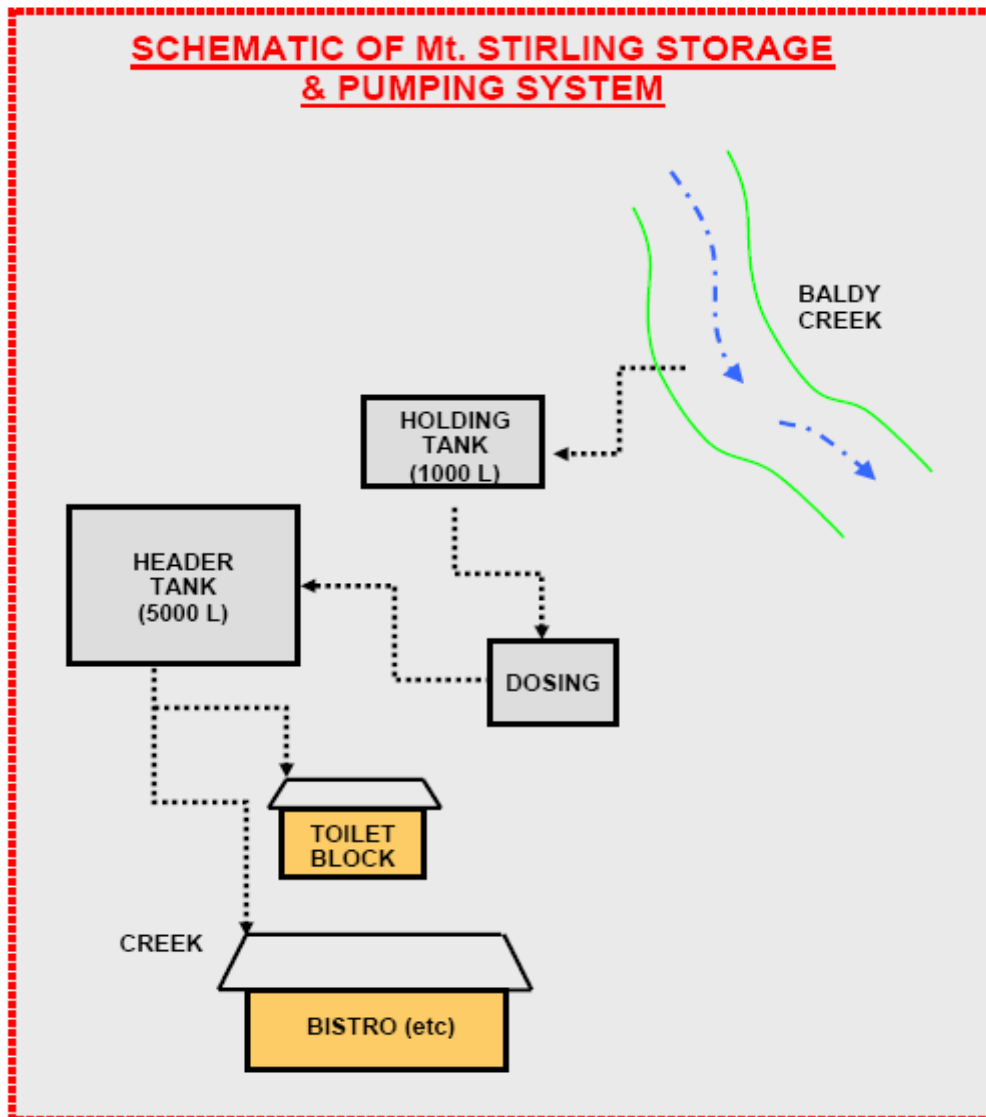
#### **14b The Reticulation System**

Water from the creek is fed via gravity into a small 1000 litre tank. The water is then pumped through a filter and dosed with hypochlorite before being pumped to a 5000 litre header tank. The water is then gravity fed through the small reticulation system. The dosing is performed using a skid mounted package consisting of the following:

- 56 litres per minute capacity water pump;
- 0.5 litres per hour dosing pump;
- 200 micron mesh bag filter;
- 1 micron cartridge filter and a static mixer.

The schematic below depicts the TBJ water supply.

Schematic 3. TJB Water System



## 15 Water Quality Management

### 15a Disinfection

The TBJ water supply system is dosed with Hypochlorite by using a 0.5 litre per hour pump into the pumping line between the creek and the storage tank.

### 15b Management

The ARMB operates a cyclic maintenance program where the storage tanks are emptied and cleaned to remove any built up silt. The off take point from the weir is inspected weekly and cleaned when needed. The systems reticulated pipes are also flushed yearly.

### 15c Chemicals – Reg 15 (1) (i)

Hypochlorite is dosed into the drinking water as a means of disinfection. No other chemicals are used or introduced into the drinking water system.

### 15d Asthetic Characteristics – Reg 15 (1) (j)

The raw water used for the TBJ drinking supply is monitored as an adjunct to the mandated weekly monitoring program.

The table below summarises the treatment processes for drinking water supplied by the ARMB to TBJ.

Locality	Treatment Process	Added Substance	Comments
Mirimbah	1 Micron Cartridge Filter Hypochlorite Dosing	Hypochlorite	Quality of raw water monitored is high.

Table 10. Water Treatment and Added Chemicals.

### 15e Issues – Reg 15 (1) (h)

The TBJ water currently meets the aesthetic standards without further treatment. The water is monitored daily in winter and bi weekly in summer.

## 16 Water Quality 2007/08

The process for collection of water samples and delivery for testing is the same as that of Mt Buller Low and High Level reticulation systems. Water samples during the reporting period were taken from the Ski Patrol Kitchen.

### 16a E.coli

A table summarising the results of *E. Coli* testing is below.

Locality	Frequency of Testing	No of Samples	Max	% with no <i>E.Coli</i>	Number of Compliant Samples	Complying (Yes/No)
Mt Stirling - TBJ	Weekly	52	0	100	52	YES

Table 11. *E. Coli* Results

\*The Safe Drinking Water Regulations require 98% of all samples to contain no *E.coli* to be in compliance.

### 16b Actions Taken in Regard to Non Compliance

No *E.coli* was detected in the system during the reporting period.

### 16c Chlorine Based Chemicals

Chlorine (Hypochlorite) was dosed into the system. Testing for chlorine based compounds was carried out as required by the Safe Drinking Water Regulations 2005.

## Results

A table summarising the results of Chlorine Testing

Locality	Chlorine byproduce	Frequency of Testing	No of Samples	Max mg/L	Min mg/L	Max*	Compliance (Yes/No)
TBJ	Chloroacetic Acid	Monthly	12	0.007	<0.005	0.15	Yes
TBJ	Dichloroacetic Acid	Monthly	12	0.250	0.009	0.1	No
TBJ	Trichloroacetic Acid	Monthly	12	0.500	0.009	0.1	No
TBJ	Trihalomethanes	Monthly	12	0.200	0.017	0.25	Yes

**Table 12. Chlorine Residual Readings**

\*Maximum levels under the Safe Drinking Water Regulations.

The Telephone Box Junction locality was found to be non-compliant with the Dichloroacetic Acid and Trichloroacetic Acid water quality standards. In both cases, only a single result was above the health-related guideline value. All other results were below the water quality standard, indicating that it was a transient problem. No identifiable cause for the elevated result could be identified. A data handling issue resulted in the required DHS notification not occurring.

## 16d Ozone Based Chemicals

Ozone was not used during the reporting period to disinfect water at Mirimbah. No testing for Ozone was undertaken during the reporting period.

## 16e Aluminium

Aluminium based compounds ('Alum') was not used as part of the treatment process at Mirimbah. No testing was for Aluminium was undertaken during the reporting period.

## 16f Turbidity

### Results

A table summarising the results of turbidity testing is below.

Locality	Frequency of Testing	No. of samples	Max (NTU)	Min (NTU)	95% UCL of mean*	Complying Yes/No
Telephone Box Junction	Weekly	52	2.1	0.2	0.968	YES

**Table 12. Results of Turbidity Testing**

\*95% UCL results of 5.0 NTU and greater are non compliant, 95% UCL results of 5.0 and less are compliant.

## **16g Actions Undertaken in Regard to Non-Compliance**

Nil

## **16h Aesthetics**

There are currently no issues relating to the aesthetics of the water due to high turbidity.

## **16i Other Pathogen, Chemical or Substances Not Specified above that may pose a risk to human health**

No testing for other substances was carried out during the reporting period. The raw water for Mt Stirling is sourced from a region that is isolated. It is considered to be very unlikely that the Mt Stirling water supply could be subject to contamination from chemical due to industrial fall out or farming practices. This was verified via a risk assessment that was carried out on the system during the reporting period.

## **17 Analysis of Results**

### **17a Trends over time**

No analysis on the trends has been performed.

## **18 Emergency / Incident Management**

### **18a Actions**

The ARMB has developed and implemented an emergency callout procedure. The procedure includes actions to be taken in case of interruption of supply, contamination or suspected contamination of the drinking water, and receipt of reports of poor quality water. In addition, the Resort Emergency Management Plan includes a risk assessment for either contamination or suspected contamination of water, and/or malicious sabotage of the water supply. During the reporting period there was no incidents requiring such actions.

### **18b Issues**

While there have not been any threats to the drinking water supply in the past, the changed circumstances in Australia increase the likelihood of a threat or attack on the water supply. The ARMB continually review the security of the system and associated Emergency Management Plans.

### **18c Complaints**

There have been no formal complaints made in relation to the drinking water at TBJ.

## **General**

### **19. Audit**

Risk management plans have now been finalised and updated for all three water supplies. The ARMB expects these to be audited during the 2007/08 reporting period.

### **20. Summary**

During the reporting period, the ARMB has expended significant amount of resources to meet the requirements of the Safe Drinking Water Act (2003) and the Safe Drinking Water Regulations (2005). The ARMB believes that it has effectively managed the drinking water supply on Mt Buller in a manner that minimises threat to public health. Water supply systems at Mirimbah and TBJ are now also at this level. The ARMB intends to continue to develop systems and infrastructure in order to continue to maintain a high standard of water quality.

### **21. Findings of the Most Recent Risk Management Plan Audit**

At the time of completing this report the audit of the risk management plan had not been completed. The audit is due to be completed in October 2008.