# Water Quality Annual Report

# 2019/20

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## Legislative Background and Purpose

Section 26 of the *Safe Drinking Water Act 2003* (the Act) requires water suppliers and water storage managers to provide to the Secretary of the Department of Health and Human Services (DHHS) an annual report each financial year. Falls Creek Resort Management ('FCRM') is the water supplier for the Falls Creek Alpine Resort. This report is for the 2019-20 reporting period and covers issues relating to the quality of drinking water.

FCRM'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 DHHS.

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

## Introduction

FCRM 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 Energy, Environment and Climate Change.

The Board is established by the *Alpine Resorts (Management) Act* 1997 which sets out the objectives for the management of Victoria's alpine resorts.

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.

FCRM 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. During 2019-20 FCRM has continued to meet all its regulatory obligations and produce safe drinking water to its customers.

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. During the 2019 winter season the resort had over 180,000 visitors, equating to 467,127 visitor days.

This report outlines drinking water quality achieved for the 2019-20 financial year and has been prepared to provide our 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 issues relating to the quality of drinking water and is structured in accordance with the Water Quality Annual Report Guidance issued by DHHS.

The report is divided into 10 sections:

1. Overview
2. Drinking Water Treatment Processes
3. Emergency, Incident, Event Management and Resources
4. Drinking Water Quality Standards
5. Aesthetic Characteristics
6. Water Quality Complaints
7. Risk Management Plan Audit
8. Undertakings
9. Regulated Water
10. Glossary of terms and further information.

# 1 Overview

FCRM 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.

In recent years, FCRM 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 FCRM to continue to work to achieve safe drinking water within the resort.

Falls Creek Resort Management's drinking water risk management plan (RMP) discusses the measures adopted by the Resort Management Board to comply with the Act and the Regulations. There is a clear statement of executive commitment which acknowledges the organisation's obligations under the Act. FCRM 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 FCARMB 2019 Annual Report acknowledges responsibilities under the Act and notes a range of FCARMB activities in complying with the requirements of the Act.

Given that the Falls Creek system is relatively both small and simple, the staffing is adequate to resource the water quality management task. The human resources devoted to the water quality management plan are discussed more fully in Section 3 Part 3. FCARMB have a core water quality group of four people. This group is adequate to resource the routine activities outlined in the RMP and is supplemented by external contractors for complex or large projects.

## 1.1 Water Supply System

### 1.1.1 Overview

The water supply system is comprised of the following elements:

- Two separate ground water sources
  - A vertical Production Bore located near the raw water storage tanks;
  - Horizontal Bore, located near the Production 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.) 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 transferred 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

**Figure 1 - Diagram of supply system**

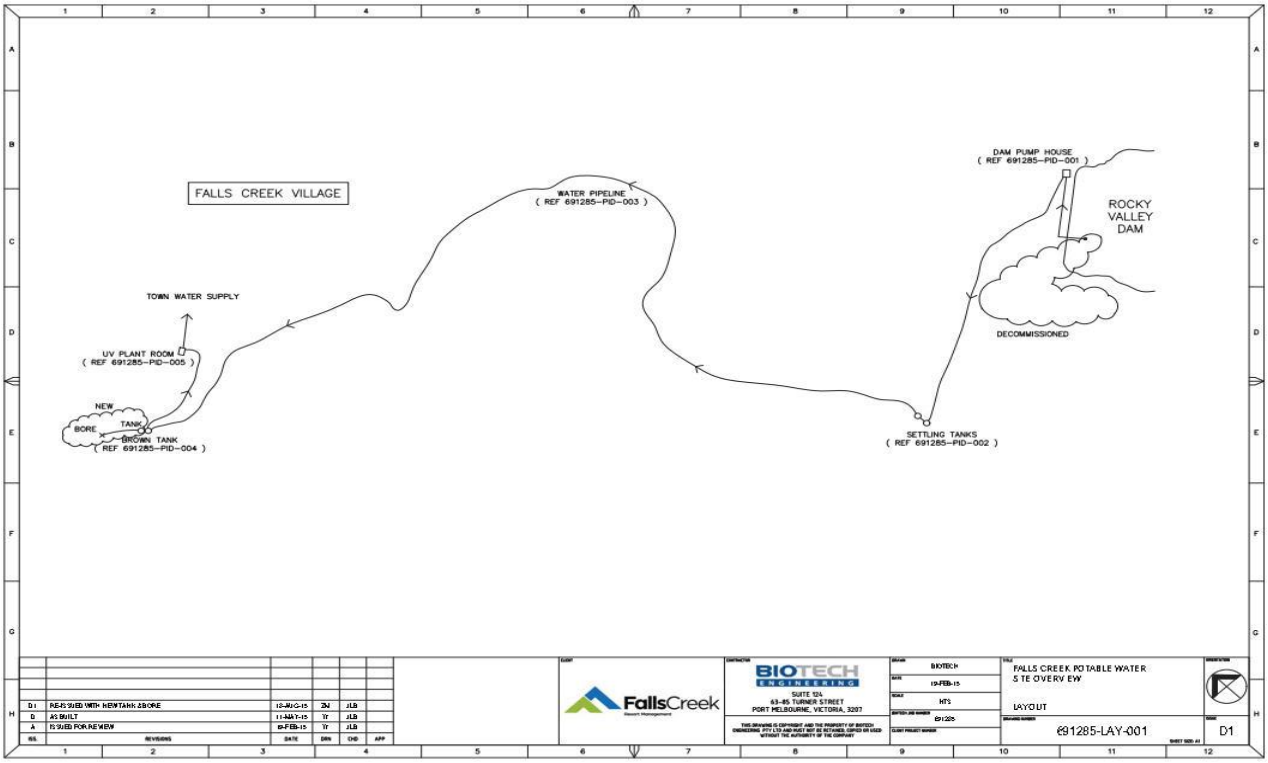
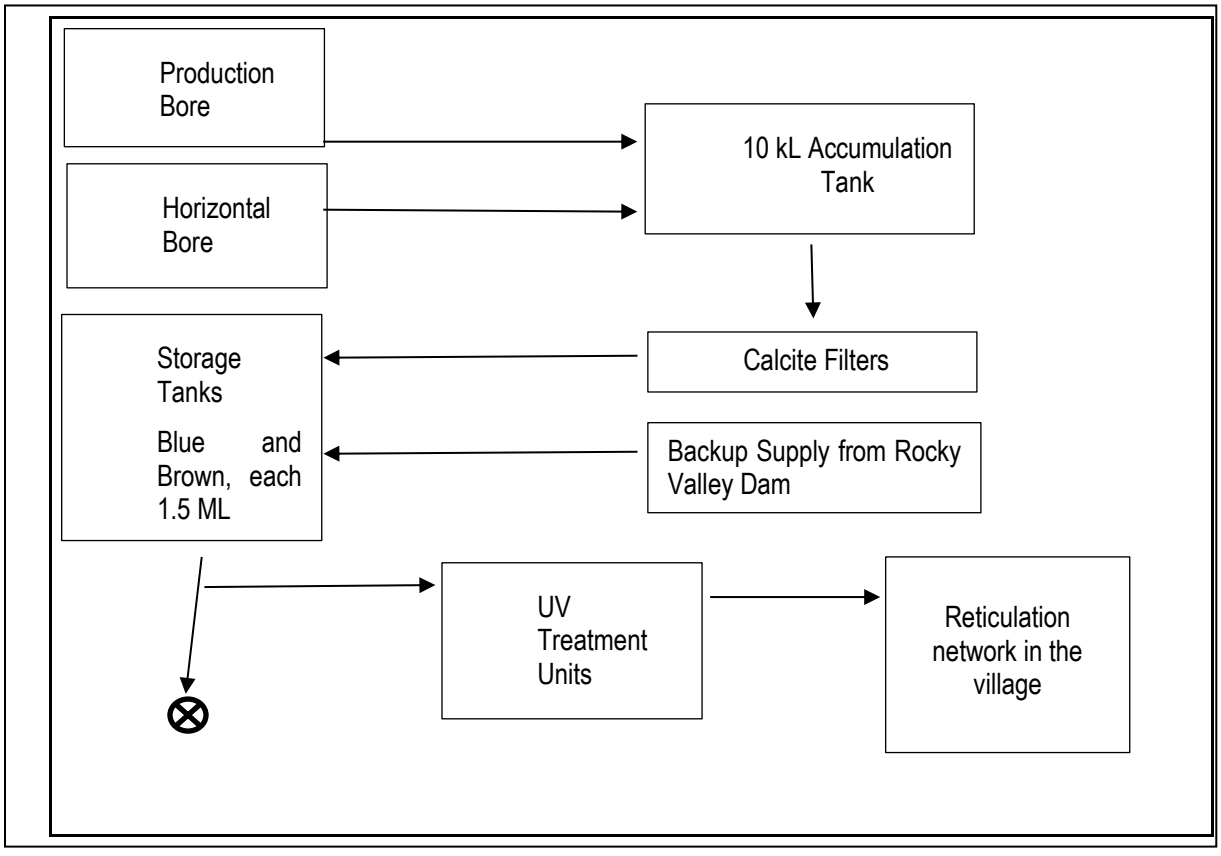



**Figure 2 Schematic Diagram of Bore, Horizontal Drains, Accumulation Tank, Calcite Filter, Header Tanks, UV system and UV By-pass.**



### 1.1.2 Groundwater Sources

Geological and hydrogeological studies have been undertaken by FCRM 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.

Groundwater is collected in a 10kL Accumulation Tank, pH adjusted via the Calcite Filter system, and transferred to the Brown and Blue Storage Tanks.

**Production Bore**

Approval for the Production Bore 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 bore were obtained. 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 Production Bore was commissioned in 2016. It sources groundwater from a depth of 60 metres below ground level and pumps from a depth of 53 metres.

In keeping with the licence requirement, the bore is 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 bore and support the grout. Below the bentonite, gravel packing has been placed between the borehole and the casing.

SCADA records of water level in the bore demonstrate that there is an expected decrease in response to pumping. While the nature of the fractured geology allows the bore 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 bore is situated a very short distance 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 these bores are horizontal, the risk of contamination from surface runoff and subsurface contaminated soakage is reduced. These bores and the associated surface casings are positioned either below ground level or behind a concrete head wall, again reducing risks associated with human interference.

**New Bore**

FCRM has received a permit from GMW to construct an additional bore to supplement the existing two bores. The bore will be located 320m from the current bore in an alternate fracture zone to the current bores. The bore is proposed to be constructed in the 2020-21 summer works period.

The dam is owned and operated by AGL, therefore any maintenance or works that could impact the quality or supply of water from the dam can not be controlled by FCRM. The development of an additional production bore will remove the reliance on Rocky Valley Dam during peak winter demand and ensure FCRM can supply high quality drinking water to the village without the need to utilise Rocky Valley Dam.

**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).

### 1.1.3 Back up Rocky Valley Dam supply

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. FCARMB also exercises significant controls over land use and visitor activity within the resort area.

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 FCRM 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). FCRM now avoid the use of the dam during the summer stratification periods as the bore has sufficient capacity to cope with demand.

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

Recreational boating under strict conditions is permitted on this water body in summer months and regular patrols are undertaken. 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 temperature results in very limited participation in swimming. While the lake is openly accessible to the public, the supply infrastructure is inspected daily and, apart from infrequent, very minor incidents, there has been no history of vandalism.

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 long-term results from monitoring raw water from the Rocky Valley Dam supply typically show that E. coli detections are rare. Positive detections typically show only single digit concentrations of E. coli per 100 mL.

Very few contamination risks have been identified in the catchment and other elements of the Rocky Valley Dam water supply. However, like any surface water, there is sufficient risk to justify disinfecting the source.

### 1.1.4 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).

### 1.1.5 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.

**By pass arrangement**

The two valves to by-pass the UV treatment plant are locked and can only be activated under a controlled process using alternate disinfection in the Storage Tanks. A documented procedure has been developed to provide guidance for the operation of the by-pass valves. This procedure is only required in the event of large-scale maintenance/upgrade requirements for the UV Treatment Plant or if there is a catastrophic failure of the system and requires hypochlorite dosing of the water supply and bypassing of the building.

The by-pass valves are subject to preventative maintenance and operational checks.

The valves are stroked annually to confirm operation. This is executed during the chlorination of the raw water tanks and reticulated network. This ensures that the water running through the bypass system is chlorinated (treated) and guarantees the integrity of the water being supplied.

### 1.1.6 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 5300 people. Water samples are collected from four locations throughout the reticulation system.

## 1.2 Implications for Risk Management

### 1.2.1 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.

### 1.2.2 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;
- 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.

## 1.3 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.

## 1.4 Demand

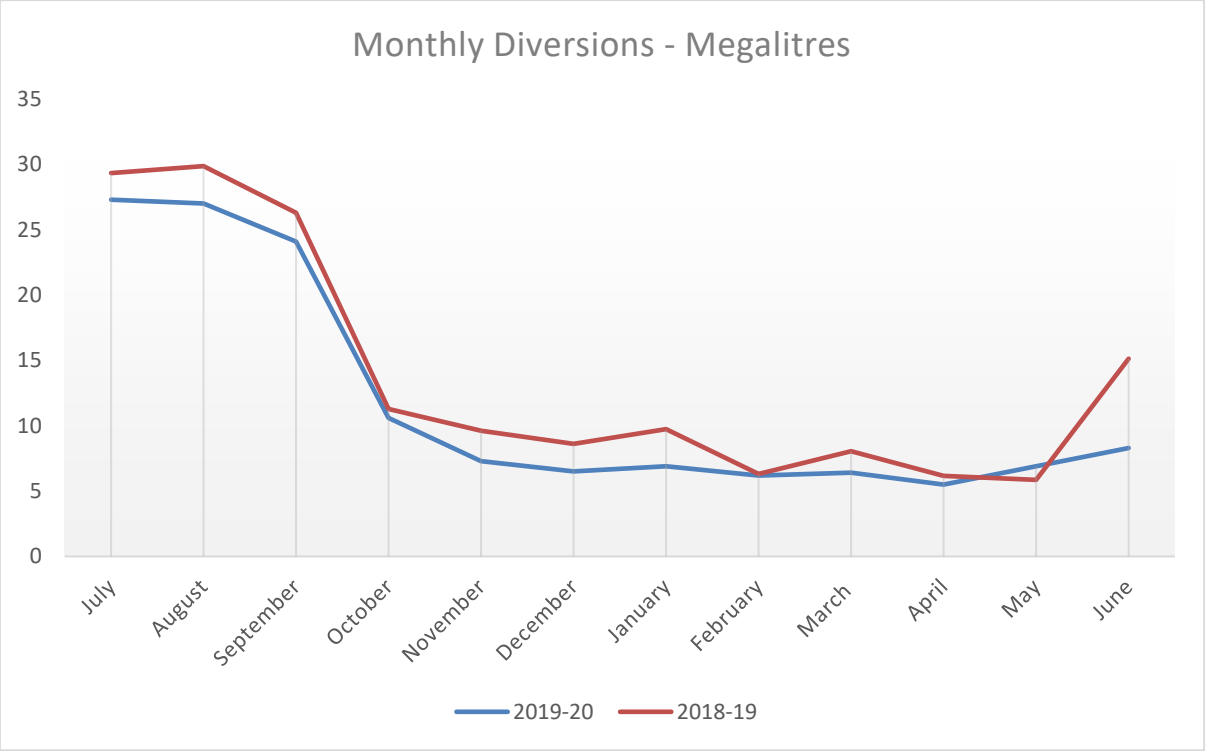
System demand varies with seasonal visitation and the average daily flow fluctuates from around 0.2 megalitres per day (ML/d) up to 1.1 ML/d during the peak of winter (population approx. 5300). The total volume consumed from the supply sources for the last four years is as per Table 1 below.

**Table 1: Annual Water Diversions**

| Year | Volume Diverted (ML) |
|---|---|
| 2019-20 | 143 |
| 2018-19 | 166 |
| 2017-18 | 169 |
| 2016-17 | 167 |

The winter seasonal nature of highest consumptive use is demonstrated in the following graph of monthly diversions. The average water consumption for the past three reporting periods was 167ML a year. The water consumption for the 2019-20 reporting period is 143ML. The drop in

demand is associated with the 2019-20 bushfires and the COVID-19 pandemic. These two events had dramatically reduced visitation to the resort.



# 2 Drinking Water Treatment Processes – r. 16(e)

## 2.1 Water Treatment

### 2.1.1 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 contacting the groundwater with Calcium Carbonate. 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.

### 2.1.2 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 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, FCARMB 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 a UPS and back-up generator rated to the full system load.

**Table 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 | Nil | |

## 2.2 Issues

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

## 2.3 Chlorine based disinfection by-product chemicals

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

Based on this Falls Creek does not test for Trihalomethanes as a part of the weekly water monitoring program.

# 3 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).

FCRM has an Emergency Management Plan 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 Emergency Management Plan is audited once every three years. The most recent independent audit of this plan undertaken by the State Emergency Service was conducted in April 2018, which found the plan compliant.

## 3.1 Known or Suspected Contamination Reported Under Section 22

There were no incidents that were reported to DHHS under Section 22 of the Act.

## 3.2 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.

## 3.3 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.

| Staff | Name | Service | Qualifications |
|---|---|---|---|
| Director of Infrastructure & Mountain Response | Callum Brown | 7 years | Bachelor Engineering – Mechanical |
| Asset & Operations Manager | Fred Weir | 12years | Diploma of Water Industry Operations<br>Diploma of Project Management |
| Water Treatment Plant Operator | Dave Hunt | 11years | Certificate III in Water Treatment |
| Water Treatment Plant Operator | Jamie Grundy | 5 | Certificate III in Water Treatment |
| Trainee Water Treatment Plant Operator | Position to be filled Jan 2021 | | |

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

## 4.1 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 DHHS 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.

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

### 4.2.1 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, with the exception of 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 3: 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) |
|---|---|---|---|---|---|
| 2019-20 | Weekly | 104 | 0 | 0 | 0 |
| 2018-19 | Weekly | 104 | 0 | 0 | 0 |
| 2017-18 | Weekly | 104 | 1 | 1 | 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.

### 4.2.2 Turbidity

Standard as stated in Schedule 2 of Safe Drinking Water Regulations: The 95$^{th}$ 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 4: Turbidity Sampling Results**

| Year | Sampling Frequency | No. of samples | Maximum turbidity in the sample (NTU) | Maximum 95$^{th}$ percentile of turbidity results in any 12-months (NTU | Number of 95$^{th}$ percentile of results in any 12-months above the standard |
|---|---|---|---|---|---|
| 2019-20 | Weekly | 52 | 4.9 | 2.6 | 0 |
| 2018-19 | Weekly | 52 | 3.4 | 1.5 | 0 |
| 2017-18 | Weekly | 52 | 3.3 | 2.0 | 0 |

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

FCRM 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 5: Health Risk Parameters Sampling Results**

| Parameter | Frequency of Sampling | Number of Samples | Drinking water quality standard (mg/L) | Maximum test value (mg/L) | Number of samples where standard was not met (s. 18) |
|---|---|---|---|---|---|
| Arsenic | 6-monthly | 2 | 0.01 | <0.001 | 0 |
| Cadmium | 6-monthly | 2 | 0.002 | <0.0002 | 0 |
| Chromium | 6-monthly | 2 | 0.05 | <0.001 | 0 |
| Copper | 6-monthly | 2 | 2 | 0.004 | 0 |
| Lead | 6-monthly | 2 | 0.01 | <0.001 | 0 |
| Manganese | 6-monthly | 2 | 0.5 | 0.002 | 0 |
| Mercury | 6-monthly | 2 | 0.001 | <0.0001 | 0 |
| Nickel | 6-monthly | 2 | 0.02 | <0.001 | 0 |
| Selenium | 6-monthly | 2 | 0.01 | <0.001 | 0 |
| Sulphur | 6-monthly | 2 | 250 | <0.5 | 0 |

## 4.4 Drinking Water Quality Reports – s. 23

FCRM met all water quality standards for the reporting period. Section 23 of the Act requires FCRM 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 FCRM on (03) 5758-1200 during business hours or by email to fcrm@fallscreek.com.au

# 5 Aesthetic Characteristics - r. 16(k)

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 6: Aesthetic Parameters Sampling Results**

| Parameter | Frequency of Sampling | Number Samples | Units | Mean Value | Maximum test value | Minimum test value | ADWG Guideline |
|---|---|---|---|---|---|---|---|
| pH | Weekly | 52 | pH units | 6.8 | 7.2 | 6.6 | 6.5-8.5 |
| Total Dissolved Solids | Annually | 2 | mg/L | 13 | 16 | 10 | 1000 |
| Total Alkalinity | 6-monthly | 2 | mg/L | 4.5 | 5 | 4 | N/A |
| Calcium | 6-monthly | 2 | mg/L | 0.5 | 0.5 | 0.5 | N/A |
| Chloride | 6-monthly | 2 | mg/L | <1 | <1 | <1 | 250 |
| Hardness | 6-monthly | 2 | mg/L | 2 | 2 | 2 | 200 |
| Iron | See Note | 2 | mg/L | 0.001 | 0.001 | 0.001 | 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 |
| Silica | 6 Monthly | 2 | mg/L | 4.05 | 4.2 | 3.9 | N/A |
| Sodium | 6 Monthly | 2 | mg/L | 0.8 | 0.8 | 0.8 | 180 |
| Zinc | 6 Monthly | 2 | mg/L | <0.001 | <0.001 | <0.001 | 3 |

Note: Until April 2017 testing for iron had been conducted on a weekly basis due to the stratification issues with the Rocky Valley Lake. Following the shift to groundwater as the primary supply source and following a comprehensive risk review and update to the risk management plan, testing is not conducted on a monthly basis. The parameter is now tested twice annually as a part of the monitoring program, and additional internal testing when the surface water supply is in use. This is generally only during the peak winter months.

## 5.1 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.

# 6 Water Quality Complaints – r. 16(j)

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

**Table 7: Water Quality Complaints Summary**

| Type of Complaint | 2019/20 No of Complaints | No. of complaints per 100 customers supplied. | 2018/19 | 2017/18 |
|---|---|---|---|---|
| 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 |

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

FCRM conducted an audit of the Water Supply Risk Management Plan in April 2020. 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 three years. Auditors must be certified under the Exemplar Global Incorporated Water Quality Management Systems and approved by DHHS.

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 Resort Management to ensure continuous improvement with water operations. The OFI's and FCRM responses are outlined in the table below

| IDENTIFIED OFI | FCRM Comments | Implementation |
|---|---|---|
| *A very high priority suggestion is to complete the additional water supply bore - this installation is only partially completed.* | Bore construction permit has been received and tender has been sent out. | Scheduled for completion November 2020 |
| *It is also suggested as a very high priority to upgrade your SCADA software to the latest version - this will have many benefits and further strengthen your critical control points. There are new features, for example, alarms going to SMS messages on phones. We also suggest as part of this to further review the alarm protocols and training.* | FCRM has issued the contract for the SCADA upgrade works. | November 2020 |
| *It is also very encouraging to note that as part of the review of the Standard Operating Procedure (SOP) for the flushing of pipework, this SOP task is now in the Maintenance Connection program, twice per year and the maintenance of the scouring system is once every five years.* | Noted | Already implemented |
| *Suggested this hypochlorite dosing installation is carefully reviewed by a specialist supplier and, for example, partially external to the UV plant room.* | Contractors have been contacted and RFQ issued for the dosing system. | December 2020 |
| *We also agree it's a high priority to install an emergency standby generator for the water pumps. There is a concern the water* | FCRM has engaged an electrical contractor to design / size the backup generator for the water supply building. The upgrade project has been included in the FY21 Capital Budget. | FY2021 |

| | | |
|---|---|---|
| *tanks would only have water for a limited period in the event of a power failure. It is also under review to also install this external to the UV plant room to prevent overheating of the UV control panel.* | | |
| *We note that security cameras now installed in the primary drinking water tank areas. Suggest as a medium priority considering further upgrading this with more security cameras.* | We are investigating areas that may benefit from the implementation of security cameras. | TBC<br>Under Review |
| *We note that Australian Gas Light who manages the lake has not yet supplied a copy of their report; it is under review to consider a yearly meeting instead. Suggest this a low priority, and when the new bore is operational this will no longer be a priority* | This is not considered a high priority due to the reduced usage of Rocky Valley Dam. The dam has not been used to source water for over 12 months. | FY2021 |
| *Suggest also consider leak detection technologies; this will also help increase system visibility and should be able to identify where water leaks are occurring accurately; this again can help optimize resources. Though this is a lower priority as unscheduled water losses have been reduced via system improvements.* | We will look into this as see if this is something that would be beneficial for our network. | TBC<br>Under Review |

## 8 Undertakings – r. 16(c)

FCRM does not have any undertakings with the Department of Health and Human Services.

## 9 Regulated Water – r. 16(l) & 16(m)

FCRM does not manage any regulated water supplies.

## 10 Glossary of Terms and Further Information

| | |
|---|---|
| Act | Safe Drinking Water Act 2003 |
| ADWG | Australian Drinking Water Guidelines 2011 |
| AWA | Australian Water Association |
| CMA | Catchment Management Authority |
| DHHS | Department of Health and Human Services |
| 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 |
| FCRM | Falls Creek Resort Management |
| kL | Kilolitre – 1,000 litres |
| 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 e.g.: pH = 7 is neutral; pH < 7 is acidic; pH > 7 is basic |
| Potable | Drinkable, suitable for human consumption |
| Regulations | Safe Drinking Water Regulations 2015 |
| Turbidity | A measure of the muddiness of water which may be caused by suspended fine clay particles, silts, algae, organic plant and animal debris |
| UV | Ultra Violet |