FallsCreek
Resort Management

Water Quality Annual Report

2016/17

Table of Contents

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 2016-17 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 2016-17 FCRM has continued to meet all of its regulatory obligations and produce safe drinking water to its customers.

The village population, and consequent demand for water, is highly seasonal. Approximately 169,000 people visited the resort during the 2016 winter season resulting in 446,000 visitor days. Total visitor days for the year were 615,000.

This report outlines drinking water quality achieved for the 2016-17 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 in June 2017.

The report is divided into 10 sections:

1. Overview
2. Drinking Water Treatment Processes
3. Emergency, Incident and Event Management
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.

For further information, please contact FCRM's Director Infrastructure and Mountain Response, Callum Brown on (03) 5758-1200 during business hours.

1 Overview

FCRM strives 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.

Since 2014, 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. These include duplication of the water storage facilities, replacement/upgrade of the UV disinfection plant and associated pipework, and commissioning of an alternative water source. The development of these activities indicates the practical commitment of FCRM to continue to work to achieve safe drinking water within the resort.

With the completion of these upgrades FCRM has undertaken a comprehensive review and update of the drinking water risk management plan (RMP) which sets out and discusses the measures adopted 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 2016 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 5. FCARMB have a core water quality group of six people. This group is adequate to resource the routine activities outlined in the RMP and is supplemented by external contractors for complex or longer-term projects, such as those mentioned above.

1.1 Water Supply System

1.1.1 Overview

The current water supply system is comprised of the following elements:

- Two separate ground water sources
  - A vertical Production Bore located near the Brown Tank;
  - Horizontal Bore, located near the Production Bore;
- An Accumulation Tank and Calcite Filter prior to the Header Tank to mitigate pH levels in the groundwater;
- 2 x 1.5 ML water storage vessels located above the village

In addition, the following recent upgrades have been made:

- New storage facility inlet works provided the capacity for FCARMB to fill the storage tanks (Brown and Blue) either from the groundwater source or from surface water in Rocky Valley Dam;
- A new UV Treatment System was introduced which replaced the old technology UV with two "state of the art" UV units. The two new UV water treatment units operate simultaneously. The automation system controls the operation and monitors the status of the water UV treatment units.

The previous water supply system was comprised of the following elements:

- 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. However, it should be noted that the water in the dam was usually of a high quality and clarity;

- A pipeline that conducted water via gravity flow from the Settling Tanks to the Brown Header Tank;
- UV Treatment; and
- Reticulation system.

The current duty of the previous supply system elements upstream of the storage tanks (Rocky Valley Dam supply) is primarily required as back-up for firefighting, supplemental supply during peak demand and to provide an alternate source in the event of a supply failure of the ground water system. With a planned second vertical production bore, reliance on Rocky Valley Dam will be further reduced.

Figure 1 - Diagram of supply system

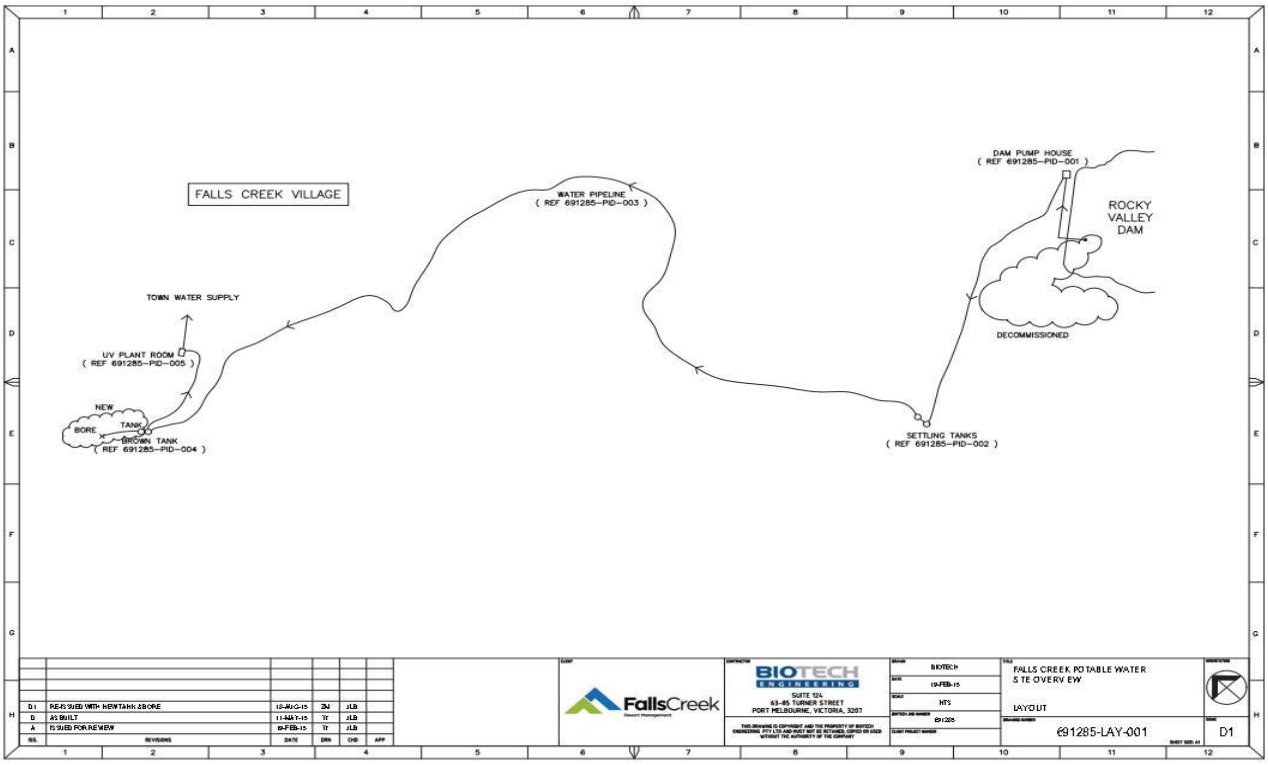
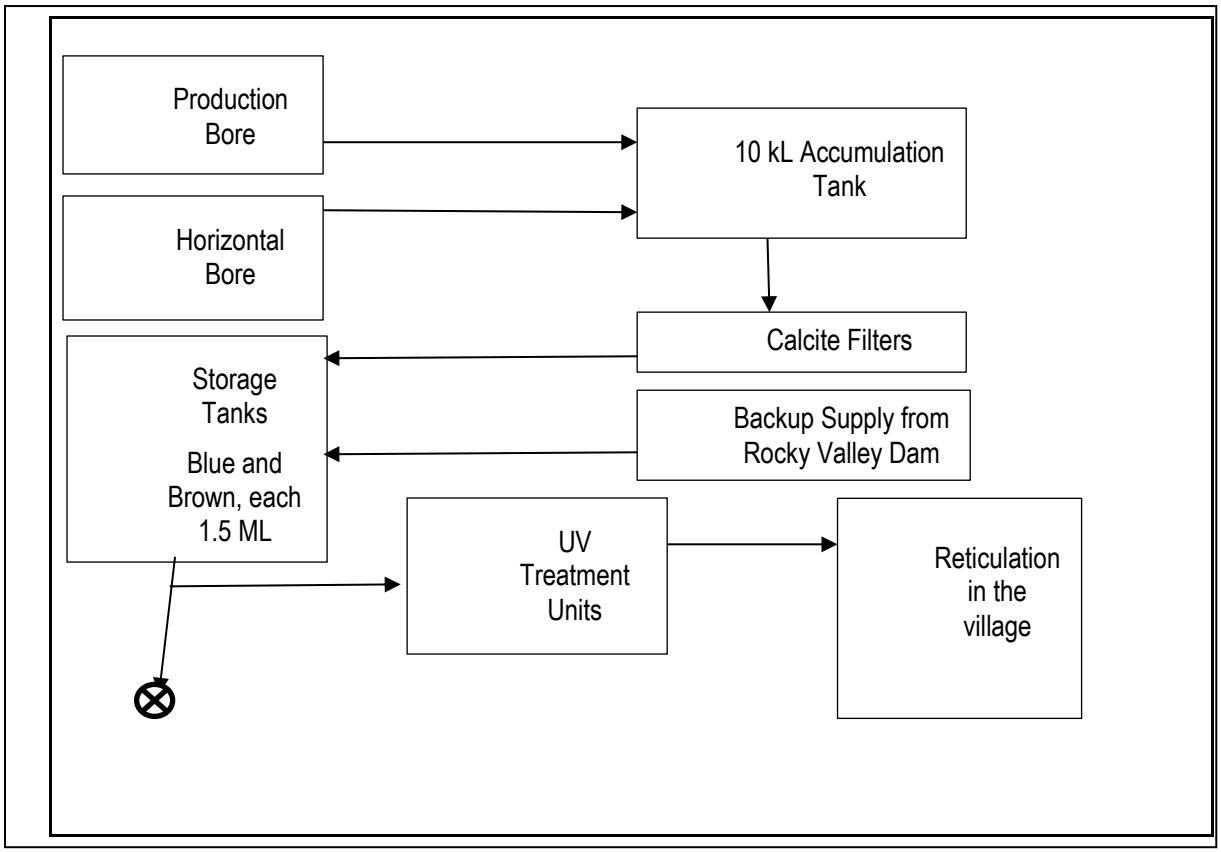


Figure 2 Schematic Diagram of Bore, Horizontal Drains, Accumulation Tank, Calcite Filter, Header Tanks, UV system and UV By-pass.



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 10 kL 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 minimal surface water ingress. The groundwater, however, should be assumed to be under the influence of surface water because of the fractured geology.

The new 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.

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 Guielines 2011 (ADWG).

Accumulation Tank and Calcite filters

Water from the Production Bore and the Horizontal Bore is first collected in a 10 kL Accumulation Tank and contacted with Calcium Carbonate through a calcite filter.

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 hydro-electricity. 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 regularly 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 minimal detectable E. coli in 100 mL samples. Positive detections typically show only single digit concentrations of E. coli per 100 mL. The average reading for the last 3 years is one E. coli per 100 mL sample and the range is from zero to 9 organisms per 100 mL sample.

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 addition of a duplicate Storage Tank increased storage of raw water and introduced some redundancy into water supply. The 1.5 ML capacity of the Brown Tank provided 125% of current daily maximum demand. Duplication with the Blue Tank will now provide a much longer time buffer at 250% of current daily maximum demand.

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 and requires hypochlorite dosing of the water supply.

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

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 unplasticised Polyvinyl Chloride (uPVC). Condition assessments have indicated that there is a low risk of corrosion failure over the next thirty years.

The reticulation system supplies a permanent population of approximately 120 people during Summer with short-term summer event populations reaching up to 3500 people and winter resident populations of up to 5000 people. Water samples are collected from three locations throughout the reticulation system.

1.2 Implications for Risk Management

1.2.1 Groundwater Supply

The Production and Horizontal Bores associated with the new 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 pipework between the bore surface casings and the Accumulation Tank is 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 new, 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 there have been no E. coli detections in either raw or treated groundwater.

1.2.2 Rocky Valley Dam Backup Supply

The previous Rocky Valley Dam supply, now 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.

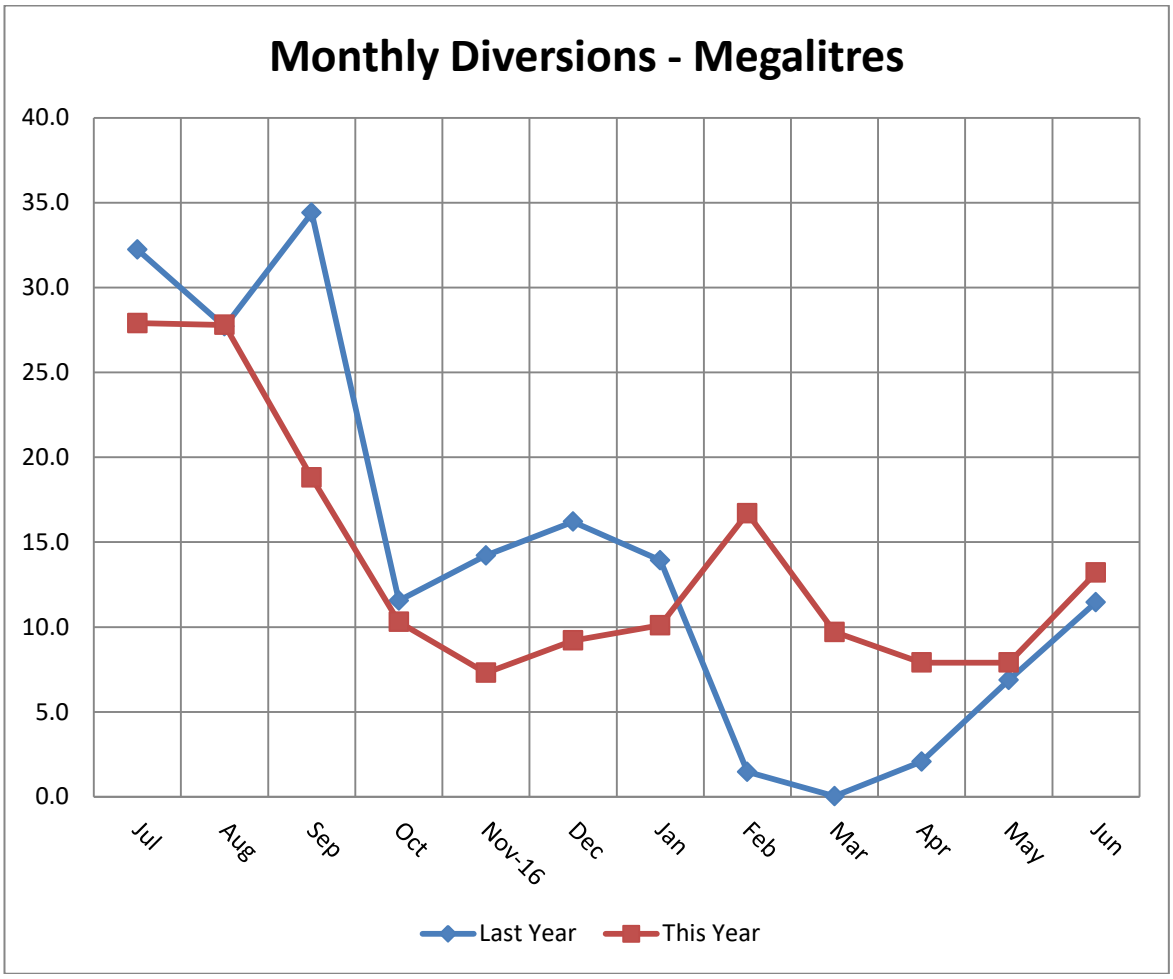
1.4 Demand

System demand varies with seasonal visitation and the average daily flow fluctuates from around 0.25 megalitres per day (ML/d) up to 1.2 ML/d during the peak of winter (population approx. 5000). The total volume consumed from the supply sources for the last four years is as per Table 1 below.

Table 2: Annual Water Diversions

Year	Volume Diverted (ML)
2016-17	167
2015-16	162
2014-15	147
2013-14	180

The winter seasonal nature of highest consumptive use is demonstrated in the following graph of monthly diversions.



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 10 kL 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.

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 new UV units incorporating 50:50 stream split duty between the two units to ensure that both units are always available for duty, without any warm up time lag. Both units are sized to meet full flow capacity if required.

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 3: 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 backwash of calcite filter
	Disinfection Plant	UV treatment	Nil	

2.2 Issues

There were no issues with the water treatment processes during the reporting period.

2.3 Chlorine based disinfection by-product chemicals

Falls Creek does not use chlorine based disinfection products so this parameter is not monitored.

2.4 Ozone based disinfection by-product chemicals

Falls Creek does not use ozone based disinfection products so this parameter is not monitored.

2.5 Aluminium

Falls Creek does not use aluminium based products in its treatment process so this parameter is not monitored.

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 a Municipal Emergency Management Plan as required under the *Emergency Management Act 1986* and this plan is regularly updated and audited. The action statement for a potable 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 most recent independent audit of this plan undertaken by the State Emergency Service was conducted in June 2015, which found the plan compliant.

3.1 Known or Suspected Contamination Reported Under Section 22

There were no incidents requiring notification under Section 22 of the Act during the reporting period.

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 or had the potential to impact the water quality, but not the safety, of the water supplied during the reporting period.

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

4.1 Safe Drinking Water Regulations 2015

Drinking water supplied during the reporting period was required to meet the water quality requirements of the Safe Drinking Water Regulations 2015. All drinking water supplied at Falls Creek met the drinking water quality standard, and there were no reports made under s. 22 relevant to the standard for any of the required samples collected and analysed.

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

4.2.1 E. Coli

Standard: 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 4: E. Coli Sampling Results

Year	Sampling Frequency	No. of samples	Maximum detected (orgs/100mL)	Number of detections and investigations conducted (s. 22)	No. of samples where standard was not met (s. 18)
2016-17	Weekly	104	0	0	0
2015-16	Weekly	104	0	0	0
2014-15	Weekly	104	0	0	0

4.2.2 Turbidity

Standard: The 95th percentile of results for samples in any 12-month period must be less than or equal to 5.0 Nephelometric Turbidity Units (NTU)

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

Table 5: Turbidity Sampling Results

Year	Sampling Frequency	No. of samples	Maximum turbidity in the sample (NTU)	Maximum 95th percentile of turbidity results in any 12-months (NTU	Number of 95th percentile of results in any 12-months above the standard
2016-17	Weekly	52	10.0	2.0	0
2015-16	Weekly	52	2.1	0.8	0
2014-15	Weekly	52	3.1	0.9	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 2016-17, 2015-16 and 2014-15 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. Testing of these parameters from the groundwater source indicates that all are below the detectable limits.

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

Table 6: 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	0.010	<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	0.5	0.22	0
Fluoride	Annually	1	1.5	<0.05	0
Lead	6-monthly	2	0.01	<0.001	0
Manganese	6-monthly	2	0.5	0.4	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	500	<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. With the exception of iron, all parameters tested met the ADWG aesthetic guideline values for the reporting period.

Table 7: Aesthetic Parameters Sampling Results

Parameter	Frequency of Sampling	Number Samples	Units	Mean Value	Maximum test value	Minimum test value	ADWG Guideline
pH	4-monthly	3	pH units	7.2	7.4	6.9	6.5-8.5
Total Dissolved Solids	Quarterly	4	EC	60	76	17	1000
Colour	4-monthly	3	HU	3	4	<2	15
Total Alkalinity	6-monthly	2	mg/L	23	38	8	N/A
Calcium	6-monthly	2	mg/L	7.1	13	1.2	N/A
Chloride	6-monthly	2	mg/L	<1	<1	<1	250
Hardness	6-monthly	2	mg/L	19	34	4	200
Iron	See Note	42	mg/L	<0.05	0.69	<0.05	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	2.1	2.6	1.6	N/A
Sodium	6 Monthly	2	mg/L	0.6	0.7	0.5	180
Zinc	Annually	1	mg/L	0.00	0.00	0.00	3

Note: Until April 2017 testing for iron has 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.

5.1 Actions undertaken where aesthetic guideline value is not satisfied.

On 18 July, 2016 the concentration of dissolved iron in the reticulation sample was 0.69mg/L which is above the guideline value. This spike was associated with water being drawn from the lake to supplement the groundwater supply during high winter demand. Operating procedures have since been reviewed to ensure adequate flushing of the lake water is carried out prior to introduction to the system. The test result the following week was <0.04 mg/L.

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 8: Water Quality Complaints Summary

Type of Complaint	No of Complaints	No. of complaints per 100 customers supplied.	Comparison with previous year
Discoloured water	0	0	0
Taste/Odour	0	0	0
Blue water	0	0	0
Air in water	0	0	0
Suspected illness	0	0	0
Other	0	0	0

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

A regulatory audit was not required to be undertaken during this reporting period. The three opportunities for improvement identified in the audit have been addressed.

8 Undertakings – r. 16(c)

Falls Creek 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
Class A Water ..... Recycled water that has been treated to a standard that enables unrestricted public use
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