Coliban Rural Customers

Health and Environmental Management Plan

Epsom Spring Gully Recycled Water Project

August 2007

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Document Review & Authorisation

Document Version	Date	Approved By	Description
0.0	9/7/2007	RMCG	Final draft (Ver 3.0) prepared by RMCG Incorporating comments from CW, EPA and DHS
0.1	21/7/2007	Derek Robertson	Minor changes made for submission to the EPA and DHS
1.0	20/8/2007	Phil Fasham	Final document

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1 Introduction

1.1 Project Overview

The Epsom Spring Gully Recycled Water Project makes use of both existing and new infrastructure to create a flexible and integrated water supply system within Bendigo. An overview diagram is provided in Figure 1-1.

Milestone 1 involves the following actions:

- Treatment at the Bendigo Water Reclamation Plant will be improved via installation of further UV capacity and new chlorination and de-chlorination equipment. A chlorine contact tank and final water tank will also be constructed;
- A 14 km pipeline to Spring Gully Reservoir will be constructed, with associated pumping facilities to transfer recycled water.

These improvements will enable recycled water to be supplied to a number of end users, including individual rural customers (initially via rural channels downstream of Spring Gully Reservoir and later by direct pipeline), public open spaces, standpipe users and industrial customers.

1.2 Quality of Recycled Water

The recycled water to be supplied will be a mix of treated effluent from the Bendigo Water Reclamation Plant at Epsom and treated groundwater from Bendigo Mining Limited. Both of these sources provide recycled water of very high quality. Limits have been determined based on *Guidelines for Environmental Management – Use of Reclaimed Water* (EPA Victoria, 2003), *Guidelines for Environmental Management – Dual Pipe Water Recycling Schemes* (EPA Victoria, 2005) and *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC & ARMCANZ, 2000). Further details are provided in the Recycled Water Quality Management Plan and the Regional Environment Improvement Plan.

The recycled water is fit for the intended purposes as listed in this document. The treated effluent produced by Bendigo Water Reclamation Plant is classified as Class A quality, meaning that pathogen levels are low. The treated groundwater from Bendigo Mining Limited is fit for the same purposes. For both sources, heavy metal concentrations are very low. The recycled water to be supplied meets Australian guidelines for livestock drinking and irrigation purposes.

Nutrient levels in the recycled water are very low compared to typical treated sewage, because the treatment process at the Water Reclamation Plant includes nutrient removal, and nutrient levels in the treated groundwater are also very low.

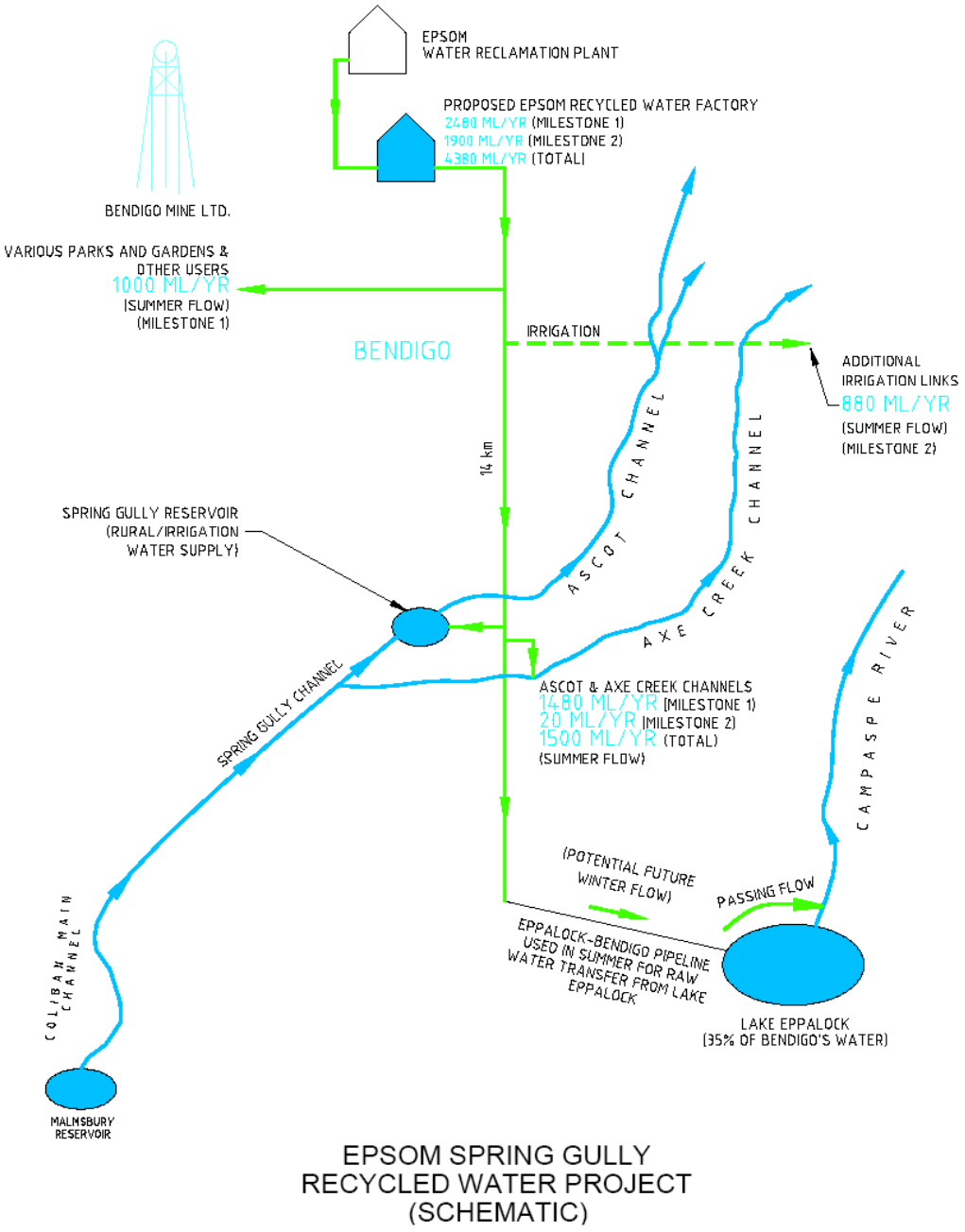
The salinity of the recycled water to be supplied in the short term will typically be around 500 mg/L TDS (around 800 EC). This is slightly higher than the current water supply, however it is lower than many sources of irrigation water, for example, groundwater from the Loddon Deep Lead aquifer has a salinity of 1100-1600 mg/L TDS. The Australian guideline for potable water is that “Based on taste, total dissolved solids in drinking water should not exceed 500 mg/L”. Much higher salinity levels are acceptable for livestock drinking water. Coliban Water plans to commission a desalination plant in early 2008 and this will reduce the salinity of the recycled water to a lower level.

As a comparison, the above salinity and nutrient levels are much lower than recycled water currently being supplied to public open spaces from Werribee treatment plant (which contains approx. salinity 1000 mg/L TDS, phosphorus 9-15 mg/L, and nitrogen 10-20 mg/L).

For rural system customers, the recycled water will be added into the existing irrigation water supply system, and will replace that usage.

The quality of the recycled water results in a low level of risk to human health and the environment. The requirements for end users of the recycled water are therefore simple and straightforward, as set out in this document.

Figure 1-1 Overview of the Epsom Spring Gully Recycled Water Project.



1.3 Purpose and Scope of this HEMP

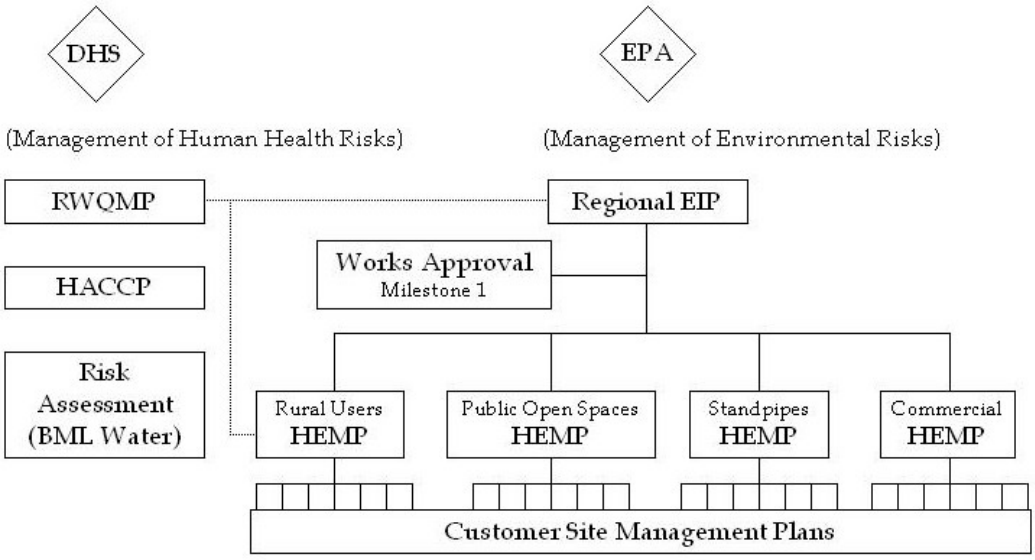
This document is the Health and Environmental Management Plan (HEMP) for Coliban Rural System customers receiving recycled water from the Epsom Spring Gully Recycled Water Project. It details the management practices required to control health and environmental risks associated with the end use of the recycled water by rural system customers. The purpose is to inform end users of their responsibilities and the limitations relating to use of the recycled water.

Note that this HEMP is intended for individual rural customers receiving recycled water. Where public open space customers receive recycled water from the Coliban Rural System, such as the Bendigo Racecourse and Bendigo Golf Course, those users are covered by the HEMP for Public Open Spaces.

This HEMP is supported by a number of other documents as outlined in Figure 1-2. Of these documents the most closely linked are:

- Regional Environment Improvement Plan (REIP) – addresses environmental and health issues associated with the operation of the system as a whole from treatment to use by the customers. The REIP includes a detailed risk assessment.
- Customer Site Management Plans – developed by the relevant customer to outline details relating to location, quantity and type of water use, and the end-use controls necessary to ensure sustainable use of recycled water.

Figure 1-2 EIP Relationships



The HEMP is also supported by a Stakeholder Engagement Strategy, which outlines the communications process for all stakeholders, including end users. The overarching goals for the communications process are to:

- Provide an open and transparent process for all stakeholders.
- Allow the community to come to their own conclusions about water recycling and its importance to a sustainable water supply for the region.
- Minimise public and stakeholder objections and reduce concerns.

- Show leadership – demonstrate long-term plans/solutions to the community.
- Develop a shared responsibility for solving the water supply problem across Bendigo.
- Ensure end users use their water for the purposes it is fit for.

2 Description of End Use

2.1 Overview

This HEMP considers the use of recycled water from the Coliban Rural System. It involves the substitution of the existing non-potable raw water supply that rural customers receive with a non-potable recycled water supply.

The rural system channels to be supplied under Milestone 1 of the Epsom Spring Gully Recycled Water Project are the Ascot channel system (including White Hills, Huntly, Goornong and Ellesmere channels) and the Axe Creek channel system (including Kangaroo channel).

Specific end uses of the recycled water include garden watering, toilet flushing, stock drinking, irrigation of pastures / crops / fruit trees, and horticultural uses.

2.2 Acceptable Uses

The recycled water is of very high quality. However, there are some restrictions on its use that must be understood by all customers prior to the use of any recycled water.

The expected quality of the recycled water to be supplied, in relation to environmental and human health risk factors, is summarized in Table 2-1. Further details can be found in the Regional Environment Improvement Plan (refer to Fit For Purpose Assessments in Appendix D), the Recycled Water Quality Management Plan, and the Risk Assessment for BML Water.

Table 2-1 Water Quality Parameters

Parameter	Recycled Water Combined Stream	Suitable for the end uses listed in this document
Microbiological quality[1]	< 10 *E.coli* org/100mL	Yes
Turbidity	< 2 NTU	Yes
BOD_5	< 3 mg/L	Yes
Suspended Solids	< 1 mg/L	Yes
pH	6 - 9	Yes
Salinity	< 500 mg/L TDS	Yes
Sodium	< 200 mg/L	Yes
Chloride	< 250 mg/L	Yes
Boron	< 0.1 mg/L	Yes
Total Nitrogen	< 5 mg/L	Yes
Total Phosphorus	< 0.5 mg/L	Yes
Chlorine disinfection residual	< 0.01 mg/L at point of use	Yes
Heavy Metals and other chemicals (aluminium, arsenic, cadmium, copper, cyanide, lead, mercury, nickel, zinc)	Within irrigation water standards and stock drinking water standards	Yes

1. The treatment process in place at Coliban Water's Bendigo Water Reclamation Plant will achieve EPA Class A recycled water with microbial criteria as follows:
   - Bacteria < 10 *E.coli*/100 mL
   - Viruses 7-log reduction from raw sewage to recycled water

- Protozoa 6-log reduction from raw sewage to recycled water

Recycled water of the quality outlined in Table 2-1 is suitable for the following purposes:

- Domestic garden watering, including vegetable gardens.
- Toilet flushing.
- Washing machine use.
- General outdoor uses such as car washing, dust suppression, construction and washdown.
- Filling water features and ponds that are not used for swimming.
- Firefighting and fire protection systems, including hydrants and sprinkler systems.
- Irrigation of human food crops, including those consumed raw.
- Irrigation of non-food crops (eg. flowers, turf).
- Irrigation of pasture/fodder for dairy and beef cattle, sheep, horses and goats.
- Livestock and pet drinking water (except for pigs).

The recycled water is <u>NOT</u> considered acceptable for the following uses:

- **Drinking.**
- **Cooking or other kitchen purposes**
- **Bathing and showering.**
- **Filling swimming pools and spas.**
- **Children's water toys.**
- **Any and all uses involving contact with pigs.**

Alternative Supply

A survey of existing rural system customers has recently been completed by Coliban Water. This identified that end use of the channel water is generally in line with the approved uses listed. However, there are a small number of customers that use channel water within the house for uses other than toilet flushing and washing machine use. Coliban Water will work with these customers to ensure their systems are altered appropriately. In the rare situation where an alternative drinking supply is not currently available, Coliban Water will arrange an alternative drinking supply with the customer.

Produce Safety

Customers using recycled water for agricultural purposes should ensure that the use of the recycled water complies with any Quality Assurance or HACCP programs that they are operating under.

2.3 Supply System

2.3.1 Pipeline

Recycled water is transported from Epsom to Spring Gully Reservoir via a trunk pipeline, which is described in section 3.2 of the Regional Environment Improvement Plan (REIP).

2.3.2 Spring Gully Reservoir

Recycled water is stored in Spring Gully Reservoir to allow distribution via the existing rural channel system.

Risks associated with storage of the recycled water in Spring Gully Reservoir have been assessed, and are documented in a separate paper titled: Spring Gully Reservoir Risk Assessment, which is attached to the Regional Environment Improvement Plan (REIP).

2.3.3 Rural Channels

Recycled water is supplied to customers via the existing rural channel system downstream of Spring Gully Reservoir. This results in the substitution of the previous non-potable raw water supply with a non-potable recycled water supply.

The channel system is a network of open earthen and concrete channels, which delivers water according to a roster system. Customers have storage dams on-site to receive the water. These storages are required because:

- Channel flows/runs are not constant, but are undertaken on a roster basis across the irrigation season. Therefore there is not a continuous supply of water and customers need to buffer demand requirements by storing water between supply times;
- The channel system is not designed to meet the peak instantaneous flow requirements of all the customers at once. The storages enable the customer to match the supply flow with their irrigation system requirements, eg. via pumping from their dam.

Therefore the system is reliant on customer dams and would not be effective without them. To deliver recycled water to rural channel customers, it is necessary for them to store it.

The channel system may overflow in certain circumstances; however the likelihood of this occurring is low. The predominate causes of channel overflows are storm events where the channels are inundated with stormwater runoff from surrounding land, or the over-release of water down the channels themselves. For the latter, the final customer at the end of a channel run is generally the recipient of extra water into their farm dam, or the excess water may be discharged into a local creek. The impact of any channels overflows are expected to be minor due to the high level of treatment that the recycled water has received. All channel overflows will be into the catchments of the Bendigo Creek or Axe Creek.

In future the channel system is to be upgraded to a piped supply. The upgrade is planned over the next 2 to 5 years.

2.4 Customers

Distribution will occur according to the existing *Licences to Take and Use Water from the Coliban Rural System*. These existing licences specify the volume of entitlement for each customer.

Coliban Water has conducted one-on-one discussions with each rural customer to clarify end uses. The results of this consultation are summarised in the two tables below, which show a break down of licence volumes and types of end use.

Table 2-2 Number of licences in each scale

Channel	Licence Volume				
	> 25 ML	10–25 ML	5–10 ML	2–5 ML	0–2 ML
	Number of Licences				
Ascot channel system	12	21	27	37	27
Axe Creek channel system	1	16	17	28	27
TOTAL	13	37	44	65	54

This table shows that the majority of customers are using relatively small volumes of water compared to commercial farming enterprises. Over 75% of customers have an entitlement of 10 ML or less, and over 50% of customers have an entitlement of 5 ML or less.

Table 2-3 Types of end use

Type of use	Number of Customers (total customers approx. 213)
Garden watering	122
Toilet flushing	38
Livestock drinking	146
Aquaculture	1
Irrigation of pasture for grazing	85
Irrigation of horticultural crop	18

Note that many customers utilising water for agricultural purposes are very small operations. They are irrigating just a few acres to grow feed for a small number of horses, cattle or sheep. The rural channel system provides primarily a stock-and-domestic water supply.

It is noted that there is one aquaculture operation currently using water from the Ellesmere channel (on the Ascot system) to grow yabbies. Suitability of the recycled water for aquaculture requires further assessment. Recycled water will not be supplied to aquaculture customers until a specific risk assessment has been undertaken for that end use and a monitoring program developed.

2.5 Roles and Responsibilities

2.5.1 Coliban Water

Coliban Water is the bulk supplier and retailer of the recycled water. They are responsible for:

- Supplying recycled water in accordance with agreements with customers, and in accordance with the Regional Environment Improvement Plan (REIP) and this HEMP;
- Operating and maintaining the Class A treatment plant, pump station and pipeline to achieve the quality standard;
- Management of recycled water distribution and monitoring following mixing of the treated effluent from the Bendigo Water Reclamation Plant at Epsom and treated groundwater from Bendigo Mining Limited;
- Obtaining endorsement of the HEMP, and ongoing maintenance of the HEMP;
- Providing an annual report on findings and compliance to the EPA;
- Keeping a register of information about customers, including addresses, quality and quantity of supply, and end use of the water;
- Informing customers of the potential risks associated with use of recycled water and assisting in the management of those risks;
- Providing a reliable system for recording and responding to complaints;
- Responding to incidents, auditing functions and establishing use agreements with relevant parties.

2.5.2 Bendigo Mining Limited

Bendigo Mining Limited (BML) are responsible for the management of their reverse osmosis treatment plant at New Moon and transfer of the treated water to Bendigo WRP. They ensure the quality of the treated water meets the Coliban/BML agreed limits.

2.5.3 Rural System Customers

The customers are responsible for using the recycled water provided for approved end uses, as defined by this HEMP. They are also responsible for implementing appropriate management and monitoring practices (also outlined in this HEMP and the Customer Site Management Plans) to ensure protection of public health and the environment.

Customers will be audited on a random basis to ensure they are meeting their responsibilities. Refer to section 6 for further details.

2.5.4 EPA Victoria

The EPA is responsible for the approval of this HEMP, the Regional Environment Improvement Plan (REIP) and the individual Customer Site Management Plans. They provide formal agreement that the project is environmentally sustainable, provided all documentation is complied with.

2.5.5 Department of Human Services

The Department of Human Services (DHS) is responsible for ensuring that Class A water quality criteria are protective of public health.

Specific responsibilities of DHS in relation to endorsing documentation for the recycled water scheme are described in the Regional Environment Improvement Plan (REIP).

3 Managing Human Health Risks

3.1 Overview

A risk assessment for the Epsom Spring Gully Recycled Water Project was undertaken in development of the Regional Environment Improvement Plan (REIP). The methodology used and outcomes of the risk assessment are detailed in the REIP.

This HEMP focuses on the practices required to manage the risks relating to end use by rural system customers. In regards to human health, the risks are low due to the high level of treatment undertaken. A summary is provided in Table 3-1. The management practices that need to be implemented by rural system customers in order to maintain these low risk levels are detailed in sections 3.2 to 3.8.

Table 3-1 Overview of Human Health Risks

Risk	Mitigation Measure	Mitigated Risk Level
Health risks for customers and workers exposed to recycled water.	The health risk from the recycled water is minimal. Customers to communicate to visiting workers (eg. plumbers and on-site workers), requirements relating to recycled water. These include washing hands before eating, drinking or smoking. (Note that risks to workers who operate the channel system are covered in the REIP.)	Low.
Contamination of the drinking water supply with recycled water due to cross connection between the two supplies within customer properties.	Above-ground recycled water and drinking water infrastructure will be separated by at least 100 mm and below-ground infrastructure by at least 300 mm. Above-ground pipes carrying recycled water will be clearly identifiable. Self-check procedure for cross-connections will be provided to Customers.	Low.
Human exposure due to drinking from recycled water outlet.	Customers will be advised that the recycled water is not suitable for drinking. Properties where recycled water is in use will be signposted. Taps that may be mistaken as drinking water sources (or are within 10 metres of drinking water sources) will be appropriately identified with lilac paint..	Low.
Inappropriate use of recycled water (eg filling swimming pools).	Advice will be provided to customers regarding acceptable use of the recycled water. Drinking water will be supplied from an alternative source (either town potable supply or rainwater tanks).	Low.
Offsite water movement or spray drift from irrigation systems.	No buffer distances are prescribed for Class A recycled water. However, spray drift should be prevented to avoid nuisance aspects of the water. Customers will be provided with advice regarding management of spray drift. Customers will also be provided with advice regarding prevention of surface runoff.	Low.
Contaminants (heavy metals, chlorine residuals) impact on human health.	Contaminant levels post-treatment are within guideline limits for the approved end uses.	Low.

Risk	Mitigation Measure	Mitigated Risk Level
Blue-green algae outbreak in customer storage dams due to increase in nutrient levels in recycled water.	Low nutrient levels in recycled water mean outbreaks are unlikely to occur. Customers to ensure nutrients from other sources do not enter dams and that there is a quick turnover of water stored where possible.	Low.

Note that risks relating specifically to on-site storage of recycled water in customer dams have been assessed, and are documented in a discussion paper titled "On-Site Storage of Recycled Water", which is attached to the Regional Environment Improvement Plan (REIP) and also available from Coliban Water's website. Management practices relating to on-site storages are listed below in section 3.8.

3.2 Residents Exposed to Recycled Water

It is important to ensure that no-one drinks, bathes or swims in the recycled water. Please communicate this to any visitors who might visit the property or work on the recycled water system (eg. plumbers).

3.3 Cross-Connections

It is important to ensure that recycled water does not enter the drinking water supply within the property, or any mains water supply external to the property.

Customers who have a connection to the reticulated potable water supply (mains water) must ensure that they have appropriate backflow prevention installed at their water meter.

Any pipework carrying recycled water within a customer's property must be physically separated from drinking water pipework, with a gap of at least 100 mm for above-ground pipes and 300 mm for below-ground pipes. Any above-ground infrastructure carrying recycled water that is located within 10 metres of drinking water infrastructure must be coloured lilac/purple to ensure that there is no confusion between the two supplies (this can be achieved by spray painting existing fixtures).

The inspection processes to be followed by Coliban Water prior to supply of recycled water, and the ongoing property inspection program, are summarised in Table 6-1, and are detailed in a fact sheet available on the Coliban Water website.

Permanent changes necessary to household plumbing to ensure that the drinking water and recycled water supplies are completely separate should be undertaken by a licenced plumber. For any future plumbing works on site, the plumber should be made aware that recycled water is in use on the property.

Customers need to make sure that their drinking water taps are connected to an appropriate drinking water supply (i.e. a rainwater tank or the reticulated potable water supply). To check this, note that in most cases the pipework supplying your taps will be half-inch copper pipes, located either under the floor or in the ceiling space. Follow the pipe supplying each tap and make sure you know where the water is coming from. Do not pump recycled water into a tank that is supplying drinking taps. If you need assistance, contact a licensed plumber.

A fact sheet will be provided to customers with a step-by-step procedure to self-test for cross connections. The fact sheet will also be available on the Coliban Water website.

3.4 Drinking from Recycled Water Outlets

Do not drink from recycled water storages or recycled water taps.

Any outside taps that may be mistaken as a source of drinking water, or are within 10 metres of a drinking water supply, must be coloured lilac/purple (this can be achieved by spray painting existing fixtures).

Each rural system customer will be provided with an information sign, to be erected at their property entrance. The sign will indicate that recycled water is **NOT** suitable for drinking, swimming or fishing.

In addition, Coliban Water will erect signs at strategic points along the open channel system to inform the public that recycled water is in use.

3.5 Inappropriate Use

Recycled water can be used for the purposes listed in section 2.2.

The recycled water is <u>NOT</u> considered acceptable for the following uses:

- **Drinking.**
- **Cooking or other kitchen purposes**
- **Bathing and showering.**
- **Filling swimming pools and spas.**
- **Children's water toys.**
- **Any and all uses involving contact with pigs.**

3.6 Spray Drift and Runoff

All residents in the City of Greater Bendigo are required to avoid causing nuisance to neighbours by appropriately managing spray drift and runoff of water over property boundaries. The same requirements apply to recycled water customers.

Many rural system customers utilise flood irrigation, in which case spray drift will not occur. For those customers using sprinkler irrigation, spray drift prevention techniques are as follows (customers can choose to implement some or all of these as appropriate to their situation):

- Ceasing irrigation in windy conditions;
- Using semi-circle sprinklers that direct spray away from boundaries;
- Providing tree screens between the irrigated area and boundaries;
- Providing a buffer zone between the irrigated area and boundaries;
- Using irrigation systems that prevent the generation of fine mist, eg. low rise sprinklers, microsprinklers.

To prevent irrigation runoff the following should be undertaken:

- Avoid over-irrigating. Water should not pool on the surface following irrigation.
- Turn off irrigation in the event of rainfall occurring (for rain events > 5mm).

3.7 Contaminants

Contaminant levels in the recycled water are very low. No special management practices are required at site of use.

Chemicals entering the Bendigo Water Reclamation Plant are managed through trade waste agreements and ongoing cleaner production initiatives at the sources. They are substantially diluted with other waste, and generally removed or degraded by the treatment processes. The groundwater from Bendigo Mining Limited is treated to ensure removal of contaminants. Further details are provided in the Regional Environment Improvement Plan.

3.8 On-Site Storage

The following management controls are proposed for management of risk relating to storage of recycled water on customer properties:

- Signs are to be installed at property entrances to identify that recycled water is **NOT** suitable for drinking, swimming or fishing;
- Customers are encouraged to limit detention times during hot summer periods to prevent algae growth;
- Customers should conduct regular visual inspections to check for algae and other contamination;
- Where blue-green algae blooms occur, do not use recycled water for stock drinking.

Note that Coliban Water will conduct monitoring of Spring Gully Reservoir to provide an indication of how recycled water behaves in storage. Coliban Water will advise customers if additional recommended management practices are identified.

Additional management practices available to rural system customers for prevention of blue-green algal blooms include:

- Establishing or improving the growth of aquatic plants that will compete with the blue-green algae for nutrients;
- Fencing out stock and establishing vegetated buffer strips around dams to intercept and trap nutrients and sediments.

A fact sheet to provide advice to customers who experience a blue-green algae bloom in their storage dam will be distributed to customers and call centre officers, and will also be available on the Coliban Water website.

In relation to fishing, possible impacts of the recycled water on fish are currently being assessed as part of proposed use in aquaculture, recreational lakes and for environmental stream flows. Outcomes of those assessments may allow the exclusion on fishing to be lifted in future.

4 Managing Animal Health Risks

4.1 Overview

As discussed in section 3.1, a risk assessment for the Epsom Spring Gully Recycled Water Project was undertaken in development of the Regional Environment Improvement Plan.

This HEMP focuses on the practices required to manage the risks relating to end use by rural system customers. In regards to animal health, these risks are low due to the high level of treatment undertaken. A summary is provided in Table 4-1. The management practices that need to be implemented by rural system customers in order to maintain these low risk levels are detailed in sections 4.2 to 4.4.

Table 4-1 Overview of Animal Health Risks

Risk	Mitigation Measure	Mitigated Risk Level
Stock become contaminated with human pathogens.	The EPA *Guidelines for Environmental Management – Use of Reclaimed Water* (Publication 464.2, 2003) outline that Class B quality recycled water is suitable for livestock drinking (with the exception of pigs) and irrigation of pastures grazed by livestock (again with the exception of pigs). The recycled water to be supplied to the rural channel system is of higher quality than Class B.	Low.
Pig meat becomes contaminated with tapeworm.	Recycled water will not be supplied to piggeries.	Low.
Salt, nitrate or nitrite levels impact on animal health.	Salt and nutrient levels post-treatment are within guideline limits for livestock drinking.	Low.
Contaminants (heavy metals, chlorine residuals) impact on animal health.	Contaminant levels post-treatment are within guideline limits for livestock drinking.	Low.
Blue-green algae outbreak in customer storage dams due to increase in nutrient levels in recycled water.	Low nutrient levels in recycled water mean outbreaks are unlikely to occur. Customers to ensure nutrients from other sources do not enter dams and that there is a quick turnover of water stored where possible.	Low.
Cattle contract Bovine Johne's disease from drinking recycled water.	There is a risk of stock contracting Bovine Johne's Disease (BJD) if recycled water is sourced from abattoirs or saleyards. Of the recycled water to be supplied via the rural channel system, only a very small percentage is sourced from saleyards. The high level of treatment provided is also expected to remove the majority, if not all, of the bacteria causing BJD.	Low.

4.2 Pigs

Pigs must not be fed or exposed to pastures, fodder or produce irrigated with recycled water, and must not be allowed to drink recycled water. This reflects a risk management approach that has been taken in Australia to ensure that there is no risk of tapeworm cycle between humans and pigs established, as has occurred in other countries. This tapeworm is specific to pigs and not found in any other animal.

4.3 Blue-Green Algae

As stated in section 3.8:

- Where blue-green algae blooms occur, do not use recycled water for stock drinking.

Management practices for prevention of blue-green algal blooms in on-site storages are detailed in section 3.8.

4.4 Bovine Johne's Disease

Customers are advised that there is a risk of BJD bacteria being present in any recycled water source containing inflows from abattoirs or saleyards. For this scheme the risk of infection is considered to be low, due to the small proportion of inflows from the saleyards and the high level of treatment undertaken by Coliban Water.

Calves of 12 months or less should be isolated from all contact with recycled water (including grazing of pasture irrigated with recycled water)

Customers should otherwise continue to manage BJD as they would when using any other water supply. Standard practices for management of BJD in beef and dairy herds can be found on the Victorian Department of Primary Industries (DPI) website.

5 Managing Environmental Risks

5.1 Overview

As discussed in section 3.1, a risk assessment for the Epsom Spring Gully Recycled Water Project was undertaken in development of the Regional Environment Improvement Plan.

This HEMP focuses on the practices required to manage the risks relating to end use by rural system customers. In regards to the environment, these risks are low due to the high level of treatment undertaken. A summary is provided in Table 5-1. The management practices that need to be implemented by rural system customers in order to maintain these low risk levels are detailed in sections 5.2 to 5.5.

Table 5-1 Overview of Environmental Risks

Risk	Mitigation Measure	Mitigated Risk Level
Excess build up of nutrients in soil resulting in adverse impact on surface waters or groundwater.	Nutrients applied in recycled water will be well below plant requirements. Build up is unlikely to occur as a result of irrigation with recycled water. Customers will be advised about the nutrient levels in the recycled water. This will enable them to slightly reduce their fertiliser use.	Low.
Salinity of recycled water impacts on plant health, soil structure, surface waters or groundwater.	Generally the risks related to the salinity of the recycled water are low. This is particularly the case in relation to stock health and the off-site environment. There are potentially some issues for customers growing sensitive plants via sprinkler irrigation, and for those irrigating impermeable soils. Customers will be advised to: ▪ Avoid sprinkler irrigation direct to plant leaves in the heat of the day – relevant to salt sensitive plants only; ▪ Where impermeable soils (eg. heavy clays) exist, to improve soil drainage (eg. via addition of organic matter or imported soil) or avoid irrigation of salt sensitive plants.	Low.
Offsite water movement or spray drift from irrigation systems.	No buffer distances are prescribed for Class A recycled water. However, spray drift should be prevented to avoid nuisance aspects of the water. Customers will be provided with advice regarding management of spray drift. Customers will also be provided with advice regarding prevention of surface runoff.	Low.
Contaminants (heavy metals, chlorine residuals) impact on plant health, surface water or groundwater.	Contaminant levels post-treatment are within guideline limits for the approved end uses.	Low.

Note that a broader range of environmental risks, including groundwater, were considered in the detailed risk assessment included in the Regional Environment Improvement Plan (REIP). Risks for elements not listed above were assessed as low and no specific management practices are required at the end use sites.

Note that the risks described above relate only to end use on customer properties. Risks relating to treatment process, water quality deviation, pipeline and pumping, and distribution

system, are listed in the Regional Environment Improvement Plan (REIP), with mitigation measures. The risks relating to the channel distribution system include leakage from open channels, and in relation to that risk it is noted that the recycled water is of high quality, that Coliban Water have an ongoing maintenance program to minimise leaks, and that in the near future the channel system will be upgraded to a piped system.

5.2 Nutrients

The recycled water contains small amounts of nitrogen and phosphorus. (The amount will be in the order of 1 gram nitrogen per square metre and 0.1 gram phosphorus per square metre.) Its is recommended that you try using smaller amounts of fertiliser, since the water you apply will be adding some nutrients. Customers growing horticultural crops using the recycled may wish to undertake a simple nutrient balance to optimize any fertiliser application rates.

5.3 Salinity

The recycled water is slightly saltier than your typical water supply. It is very unlikely that you will notice any impact on gardens or pastures from the short term salinity level, which is expected to be around 500 mg/L TDS. The only situations where you might notice an effect is if you are irrigating very impermeable soil (ie. soil drainage is poor so water takes a long time to soak in), or if you spray the recycled water onto sensitive plants in the heat of the day.

Customers are advised to:

- Follow good irrigation practices, in particular avoid sprinkler irrigation direct to plant leaves in the heat of the day. If daytime irrigation is required, use a method that does not apply water direct to plant leaves, such as drip/micro-spray, sub-surface irrigation or a hand-held hose directed at the plant base.
  This is not important for tolerant plants such as pasture and turf, but is relevant for plants sensitive to leaf damage such as citrus, apricots, almonds, potatoes and tomatoes.
- Improve the texture of impermeable soils (eg. heavy clays) to improve soil drainage (eg. by addition of organic matter or imported soil), or avoid irrigation of salt sensitive plants. This is only important for salt sensitive plants, such as fruit (eg. citrus, stone fruits, grapes, strawberries), some vegetables (eg. beans, carrots, lettuce) and some ornamental plants (eg. azaleas, roses, jasmine, flowering annuals). A more comprehensive list will be provided in a salinity information sheet that can be obtained from the Coliban Water website.

5.4 Spray Drift and Runoff

Refer to section 3.6 for details regarding prevention of irrigation runoff and spray drift.

5.5 Contaminants

Contaminant levels in the recycled water are very low. No special management practices are required at site of use.

6 Monitoring and Reporting

6.1 Monitoring

Monitoring requirements relating to end use are minimal, due to the low risk levels involved. Details are provided in Table 6-1.

Table 6-1 Monitoring – Rural System Customers

Monitoring Item	Purpose	Details	Frequency	Responsibility	Trigger	Corrective Action
Recycled water quality	Ensure recycled water is fit for purpose.	The monitoring programs for water quality are detailed in the Recycled Water Quality Management Plan. Ongoing monitoring will be undertaken of water supplied to the Epsom Spring Gully pipeline and water leaving the Spring Gully Reservoir, to ensure that the water is fit for purpose.				
Blue green algae in Spring Gully Reservoir	Ensure recycled water is fit for purpose.	Refer to Coliban's Blue Green Algae Response Plan (included as an appendix to the Recycled Water Quality Management Plan)				
Volume of recycled water used	To calculate annual water balance and invoice customers for usage.	Volume supplied to each customer will be recorded	Quarterly	Coliban Water	Annual water usage exceeds entitlement.	Consult with customer to investigate cause and address as required.
Customer checklist completed and submitted to Coliban Water	Ensure customer awareness of management requirements.	Refer to CSMPs	Annually	Customers	End of irrigation season	Supply of recycled water can be ceased until checklist submitted.
Customer property inspection	Ensure no cross connections between recycled water and potable water systems; recycled water being used only for acceptable uses. (Refer to fact sheet for details of process.)	Commissioning: Each property with reticulated drinking water connection, or with significant in-house use, will be inspected initially. Ongoing: At least 5% of properties to be inspected each year, chosen at random.	Prior to initial supply Annually	Coliban Water	Non-compliance with HEMP	Action as appropriate to issue (eg. assist customer to identify plumbing works required). Supply of recycled water can be ceased until site conforms.
Information provision	Ensure customer awareness of management requirements.	Provide information pack to new property owner	When a change of ownership occurs	Coliban Water		
Representative soil testing	Assessment of soil health over time.	Soil testing is not required for individual residents receiving recycled water. However an ongoing program of soil testing will be undertaken on selected sites such as public parks, and the results will be available on request.				

Note: The frequency of the ongoing inspections of customer properties will be reviewed with the EPA after the first year of operation.

6.2 Complaints and Faults Procedure

Coliban Water has an existing call centre, which handles all incoming queries, complaints and fault reports (i.e. leaks, burst mains, sewer overflows, supply outages and water quality issues etc). The contact number is 1300 363 200.

Call centre officers will be educated about recycled water issues, and the software prompt for call response will be updated to include recycled water issues.

When a complaint or fault report is received regarding the recycled water it will be logged and issued to the Coliban manager for the scheme. For each complaint or fault report the following is documented:

- All calls coming into the call centre are logged.
- The callers details, name, contact number are recorded where possible.
- Along with this information the details of complaint or fault report, address or location, and the specific nature of the problem are recorded.
- Some complaints and fault reports are received via mail, fax and email.

Fault reports are prioritised according to the Essential Services Commission's (ESC) Level 1 and Level 2 priority response criteria based on the severity of the impact of the fault report. A fault report will result in an operational response to rectify the issue within a prescribed time frame.

Complaints (any expression of dissatisfaction by a customer, whether verbal or written) will be formally responded to by Coliban Water within 5 working days of receipt of the complaint. Complaints (which by their very nature may also constitute a fault report) may also result in an immediate operational response to rectify the issue.

If a customer is not satisfied with Coliban Water's response to a complaint, they may have the complaint referred to an appropriate manager for review.

If the customer is still not satisfied with the response, a senior manager of Coliban Water will review the complaint. That manager will ensure that the complaint has been properly investigated and that the final decision has taken into account the customer's rights and obligations.

Customers who remain dissatisfied with Coliban Water's resolution of a complaint may lodge a complaint with the office of the Energy & Water Ombudsman (Vic) by calling 1800 500 509. Customers can also contact EPA Victoria on 1800 444 004 regarding any concerns to do with the environmental or quality aspects of the recycled water.

A summary of the complaints received will be included in the annual report from Coliban Water.

6.3 Incidents and Emergencies

Incidents occurring at end use sites that could affect the environment or human health are listed below, along with a summary of the operational response to each:

- Complaints of illness possibly due to recycled water;
  - Details of customer complaint to be recorded on Coliban Water complaints database.

- Coliban Water will advise customers that the recycled water has been treated to very high standards and the risk of becoming ill from drinking small amounts of it is extremely low. Customers will be advised to contact their doctor should they feel concerned or experience signs of illness. Contact details for the Environmental Health Unit (1300 761 874) will be provided to customers should their doctor like to speak with someone in the Department of Human Services (DHS).

- Unauthorised use of recycled water;
  - Identified during Coliban Water site inspections or from customer notifications;
  - Risk assessment and rectification undertaken by Coliban Water;
  - Coliban Water has the power to cease supply until unauthorised use issues are resolved;
  - DHS to be notified if there is any suspected potential human health risk (as assessed by Coliban Water or at request of customer).
- Cross connection of recycled water supply to drinking water supply;
  - Identified during customer self-check, Coliban Water site inspection, plumber working at site, or customer complaint;
  - Confirmation through Coliban Water inspection and if within Coliban Water supply then immediate rectification to take place (if required);
  - DHS and customer to be notified immediately of a confirmed cross connection;
  - If within the customer's plumbing, Coliban Water to cease supply immediately and instruct the customer to rectify the cross connection;
  - Risk assessment undertaken and discussed with DHS to establish likelihood of other cross connections and need for immediate follow up testing within the recycled water system;
  - DHS and EPA provided with incident report by Coliban Water.
- Leakage, spillage or runoff of recycled water beyond site boundaries.
  - Can occur due to burst in Coliban Water main, or irrigation system burst. Unlikely to be due to customer behaviour;
  - Customer to contact Coliban Water if significant runoff is noticed beyond site boundaries (so that Coliban Water can assist in managing impacts);
  - Coliban Water will attend site;
  - Coliban Water to contact EPA if confirmed to be a major spill (the circumstances in which EPA is to be notified are described in Coliban Water SOP-08E Sewer Spill Environmental Response);
  - Coliban Water to contact others as necessary;
  - Incident report provided to EPA by Coliban Water.

Incidents and emergencies occurring on a rural system customer's property should be reported immediately to Coliban Water by phoning 1300 363 200 (24 hours per day). Coliban Water will assist the customer to respond appropriately. The objective of the response is to:

- Bring the process back under control as soon as possible;

- Generate improvement plans to avoid recurrence of incident.

Coliban Water maintains an Emergency Management and Response Plan, which covers the actions, roles and responsibilities of Coliban Water Staff and others in the case of a real or potential incident which could threaten the health and safety of persons, damage to property or the environment and service to customers.

Customers can also contact EPA Victoria on 1800 444 004.

6.4 Annual Report

Following an internal review of the recycled water scheme as a whole, an annual report will be prepared by Coliban Water and submitted to the EPA.

In relation to Coliban Rural System customers, the annual report will include:

- A statement as to whether this HEMP has been complied with, or an outline of actions undertaken to address non-compliance;
- An analysis of monitoring data, collected as outlined in section 6.1;
- A summary of incidents and emergencies, including corrective actions;
- A listing of rural system customers supplied;
- A summary of complaints received, including corrective actions undertaken.

6.5 Audits

The use of recycled water by rural customers will be audited as part of the wider recycled water scheme. Details of the system audit process and frequency are provided in the REIP.

6.6 HEMP Review

This HEMP will be reviewed on an annual basis or when a major change or addition to the recycled water system is implemented. The review will take into consideration changes to:

- Customer base;
- Water quality;
- EPA guidelines;
- Regulatory requirements;
- Coliban Water policies.

Customer Site Management Plans will also be reviewed at least every 3 years to ensure they remain up to date.

References

ANZECC & ARMCANZ (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Volume 3, Primary Industries. Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand.

Coliban Water (undated) *Waterplan 2055 Securing our Water Future*.

EPA Victoria (2005) *Dual Pipe Water Recycling Schemes* – Health and Environmental Risk Management. Publication 1015. Guidelines for Environmental Management. EPA Victoria.

EPA Victoria (2003) *Use of Reclaimed Water*. Publication 464.2. Guidelines for Environmental Management. EPA Victoria.

EPA Victoria (1991) *Guidelines for Wastewater Irrigation*. Publication 168. EPA Victoria.

EPA Victoria (unpublished) *Best Practice Environmental Management Guidelines for Reclaimed Water Irrigation*. Publication 168a. (Draft Version 4, Prepared by RMCG for EPA Victoria, March 2004).

Natural Resource Management Ministerial Council, Environment Protection and Heritage Council, and Australian Health Ministers' Conference (November 2006) *National Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1).* National Water Quality Management Strategy.