Recycled Water Use
RISK MANAGEMENT PLAN

TEMPLATE

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# **Template Information**

This Risk Management Plan (RMP) template has been created by the Wastewater Management team at the Department for Health and Wellbeing (DHW) in South Australia. The intent is to guide the development of a RMP describing the use of recycled water supplied from a wastewater treatment plant (WWTP).

The quality of recycled water depends on the level of treatment applied at the WWTP. When treated to a high standard, recycled water can be safely used with minimal restrictions. Conversely, when lower quality recycled water is produced, the water contains more pathogens and requires end use restrictions to ensure that the public aren't exposed to the irrigated water.

DHW approval is required for both the supply and the use of recycled water in line with the [South Australian Public Health (Wastewater) Regulations 2013](https://www.legislation.sa.gov.au/__legislation/lz/c/r/south%20australian%20public%20health%20%28wastewater%29%20regulations%202013/current/2013.163.auth.pdf). The supply approval is held by the owner of the WWTP or Water Industry Entity (WIE) supplying recycled water, while the use approval is held by the owner of the land where recycled water is being used or by a responsible party who is managing the irrigation on behalf of the landowner.

To apply for a recycled water use approval, an application form and RMP are submitted to the Wastewater Management team at DHW.

The RMP should be well understood by the landowner of the irrigation area, as well as employees, volunteers or contractors who operate the irrigation system or work on the irrigation site.

The RMP should be reviewed every two years and updated when changes occur. Changes to the area irrigated, the method of application, the location of irrigation area, the irrigated vegetation type or to the preventative measures listed in the RMP must be approved by DHW prior to taking place.

Table 1 below provides a list of the typical responsibilities of a recycled water supplier compared with a recycled water user/s. These responsibilities should be covered in a formal contract or agreement between the supplier and the user so there is a clear delegation between the two parties.

**Table 1: Responsibilities of recycled water suppliers and users**

|  |  |
| --- | --- |
| **Recycled Water Supplier** | **Recycled Water User** |
| Responsible for:Compliance with the DHW recycled water supply approval.Ensuring that connected users have the appropriate regulatory approvals (See the relevant Acts and Regulations in Table 5) in place before supplying recycled water.Notifying DHW and connected users when there are incidents or emergencies at the WWTP or network that present a health risk.Routine sampling of recycled water for quality analysis, and provision of the results to connected users.Development and implementation of the supply RMP. | Responsible for:Compliance with DHW recycled water use approval.Maintenance and operation of the irrigation system.Sustainable management of the land and crops irrigated, ensuring that the recycled water remains on the approved irrigation site and does not run-off, pool or drift via spray, beyond the boundary. Development and implementation of the use RMP, ensuring that it remains up-to-date and reflective of the installed irrigation system.Educating staff, contractors and visitors attending the irrigation site about recycled water risks and the WHS requirements for handling recycled water. Obtainment of any other regulatory approvals (PIRSA, OTR, DEW, EPA) that may be required for recycled water use.  |

# **Template key**

The formatting, font and styles used throughout the RMP is a guide only and can be edited as needed.

All text that provides instructions or guidance (blue text) in the RMP template should be removed before the RMP is submitting the to DHW for review.

**Legend:**

|  |  |
| --- | --- |
| *Blue shaded text* | *Instructional information.* |
| Orange text | Example text that needs to be edited to suit the WWTP or irrigation area being described in the RMP. |
| Black text  | Text that can remain in the RMP (if desired). |

# Introduction

*Provide a brief introduction including the intent and reason for using recycled water for irrigation.*

# Aim

*List the aims of the document:*

This Risk Management Plan (RMP) aims to:

* Describe the management of the recycled water irrigation.
* Support an application to the DHW for recycled water use.

# Glossary

*Provide a glossary for acronyms used within the RMP.*

Table 2 Glossary

|  |  |
| --- | --- |
| **Acronym** | **Description** |
| AGWR | Australian Guidelines for Water Recycling |
| DEW | Department for Environment and Water |
| DHW | Department for Health and Wellbeing |
| EPA | Environment Protection Authority |
| LRV | Log Reduction Value |
| OPM | Onsite Preventative Measures – a measure put in place by the recycled water user to reduce the exposure of the public to recycled water. |
| OTR | Office of the Technical Regulator |
| PIRSA | Primary Industries South Australia |
| RMP | Risk Management Plan (aka RWMP) |
| RPZ | Reduced Pressure Zone  |
| RWMP | Recycled Water Management Plan (aka RMP) |
| WHS | Work Health Safety |
| WIE | Water Industry Entity |
| WWTP | Wastewater Treatment Plant |
|  |  |

# References

*Provide a reference table for any documents or guidelines used or referred to in the RMP. The entries in the table below are helpful references for recycled water use.*

Table 3: References

|  |  |  |
| --- | --- | --- |
| **Author** | **Title / Link** | **Date** |
| G & M Connellan Consultants and IPOS consulting | [Code of Practice Irrigated Public Open Space](https://www.sawater.com.au/__data/assets/pdf_file/0020/40493/Code_of_Practice_Irrigated_Public_Open_Space_201015_standard-UPDATED.pdf) | 2015 |
| National Resource Management Ministerial Council, Environment Protection and Heritage Council | [Australian Guideline for Water Recycling](https://www.waterquality.gov.au/sites/default/files/documents/water-recycling-guidelines-full-21.pdf) | 2006 |
| Office of the Technical Regulator | [Guidelines for non-drinking water in SA - infrastructure](https://www.lga.sa.gov.au/__data/assets/pdf_file/0030/554691/Guidelines-for-Non-drinking-Water-in-South-Australia%2C-Office-of-the-Technical-Regulator-OTR-Part-1-Infrastructure-2017.pdf) | 2017 |
| Office of the Technical Regulator | [Guidelines for non-drinking water in SA - on-site plumbing](https://www.lga.sa.gov.au/__data/assets/pdf_file/0037/554689/Guidelines-for-Non-drinking-Water-in-South-Australia%2C-Office-of-the-Technical-Regulator-OTR-Part-2-Onsite-Plumbing-2018.pdf) | 2017 |
| Australia and New Zealand Environment and Conservation Council. | [Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) - Volume 3 - Chapter 9 - Primary Industries](https://www.waterquality.gov.au/sites/default/files/documents/anzecc-armcanz-2000-guidelines-vol3.pdf). | 2000 |

# Version History

*Provide a version table which documents changes to the RMP over time.*

Table 4: Risk Management Plan Version History

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Date** | **Revision** | **Author** | **Company** | **Description** |
| 01/01/2024 | 0.1 | Joe Bloggs | Council | First Draft |
|  |  |  |  |  |
|  |  |  |  |  |

1. Responsible use of recycled water

*Provide a brief overview of the key stakeholders involved in managing the recycled water irrigation system. Include a summary of the responsibilities and key contacts in Table 5 below.*

Table 5: Stakeholders involved in the operation and maintenance of the Bonney Doon council recycled water irrigation sites.

|  |  |
| --- | --- |
| **Stakeholders** | **Responsibility** |
| **Water Industry Entity supplying the recycled water.**Water Utility/Council | Owner and operator of the WWTP, sewage and recycled water network.Contact:NameWater Utility - Operations Manager04587 412 213name@WIE.com.au |
| **Recycled Water User:**User | Recycled Water user at the oval and gardens in town x.Primary Contact: Donna DellParks and Gardens Manager(08) 8777 3201doona.dell@council.com.auSecondary ContactName:Position:Ph:Email: |
| **Contractors:**GreenkeepingPlumbing and Irrigation Maintenance: | Greenkeeper employed by the council to maintain oval and gardens.Contact: Gordon GloggGreenkeeper0412 252 111Gordon.gloggs@greenkeeping.com.auPlumber employed to maintain the irrigation system, backflow prevention devices and pumping station. Contact: Paul PacelliPlumber and irrigation manager0407 616 212paul@plumbing.com |

2. Regulatory Requirements

*Provide an overview of the regulatory requirements involved with recycled water use.*

Recycled water supply and use requires regulatory approvals to ensure that the irrigation of recycled water is safe and sustainable. Table 6 lists the legislation relevant to recycled water supply and use in South Australia.

Table 6: Recycled water legislation and regulations

|  |  |  |
| --- | --- | --- |
| **Components** | **Stakeholders** | **Responsibility** |
| **Regulatory and formal requirements** | DHW | Department for Health and Wellbeing: Regulators of public health protection who grant approval to supply or use recycled water as per [South Australian Public Health Act 2011](http://www.legislation.sa.gov.au/LZ/C/A/SOUTH%20AUSTRALIAN%20PUBLIC%20HEALTH%20ACT%202011.aspx) and [SA Public Health (Wastewater) Regulations 2013](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjtoe7E7tD_AhXByjgGHU9tDHsQFnoECBMQAQ&url=https%3A%2F%2Fwww.legislation.sa.gov.au%2F__legislation%2Flz%2Fc%2Fr%2Fsouth%2520australian%2520public%2520health%2520(wastewater)%2520regulations%25202013%2Fcurrent%2F2013.163.auth.pdf&usg=AOvVaw325QxYz7QD3vMJ-wnBsP67&opi=89978449). |
| EPA | Environment Protection Authority: Regulators of environmental protection as per the [Environment Protection Act, 1993](https://www.legislation.sa.gov.au/LZ/C/A/Environment%20Protection%20Act%201993.aspx). |
| OTR | Office of the Technical Regulator: Regulators of water and sewerage infrastructure standards and matters included in the Safety, Reliability, Maintenance, and Technical Management Plan ([SRMTMP](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjkkP3T69D_AhVXxzgGHSy1BT0QFnoECBQQAQ&url=https%3A%2F%2Fwww.energymining.sa.gov.au%2F__data%2Fassets%2Fpdf_file%2F0006%2F844134%2FPreparing-SRMTMPs-Water-industry.pdf&usg=AOvVaw3Pq6E4QyuKK3Z__z77ByW6&opi=89978449)) as per the Water Industry Act, 2012. |
| DEW | Department for the Environment and Water: Provider of licences for water extraction from the River Murray and Water Affecting Activities for use of ‘effluent’ while carrying on a business as per the [Landscapes SA Act, 2019](https://www.legislation.sa.gov.au/LZ/C/A/LANDSCAPE%20SOUTH%20AUSTRALIA%20ACT%202019.aspx).Administrators and advisors of the [Water Industry Act 2012](https://www.legislation.sa.gov.au/__legislation/lz/c/a/water%20industry%20act%202012/current/2012.10.auth.pdf) responsible for regulating the water industry including water planning, pricing and management of water, sewerage and stormwater services, facilities and schemes. Refer to[Department for Environment and Water - Legislation](https://www.environment.sa.gov.au/about-us/legislation) for further details.  |
| PIRSA | Department of Primary Industries and Regions, South Australian. Regulators of the [Livestock Act, 1997](https://www.legislation.sa.gov.au/lz?path=%2FC%2FA%2FLIVESTOCK%20ACT%201997). Approval is required by PIRSA when supplying recycled water to crops consumed by livestock.  |

3. Recycled water supply and use

**Source of recycled water:**

*State where the recycled water is supplied from.*

Recycled water is supplied from X WWTP.

**Use of recycled water:**

*Discuss how the recycled water will be used and what the reuse category it is (refer to Table 8).*

Table 8: Recycled water categories as described in the Australian Guidelines for Water Recycling (AGWR) 2006.

|  |  |
| --- | --- |
| **Reuse Category** | **Examples** |
| Dual Reticulation | Toilet flushing, washing machines, garden use, fire hydrants. |
| Municipal Irrigation | Ovals, parks. golf courses, dust suppression |
| Commercial Food Crops | Fruit and nut trees, cereals, vines, salad vegetables, |
| Landscape Irrigation | Trees, shrubs, public gardens |
| Non-food crop | Trees, turf, woodlots, flowers |

Recycled water will be spray irrigated at Oval X and Garden Y in the township of Z.

Recycled water use category = Municipal Irrigation.

# 4. Irrigation System

*Under the headings below, provide information on the recycled water system installed at each irrigation site. Include diagrams, drawings, or photos where possible to clearly describe the system from the recycled water supply point through to irrigation.*

**Location:**

* *Address of the irrigation site/s*
* *Size of the irrigation area/s*
* *Location of the recycled water supply point (where the recycled water main connects to site)*
* *Location of the water meter or customer interface location*
* *Provide a map or scaled site plan detailing the irrigation boundaries.*

**Storage**:

* *Irrigation supply tanks or storages used prior to irrigation. Include storage volume and type of storage e.g., 25 kL covered tank, 5ML lined earthen lagoon etc.*

**Other water sources:**

* *List any other water sources that are blended with the recycled water e.g., groundwater, storm/rainwater, or potable water.*
* *List the backflow prevention measured used where there is a cross connection with the recycled water supply e.g., air gaps, backflow prevention devices such as dual check values or RPZ valves.*

**Pumps and irrigation control:**

* *Discuss the irrigation control. Is there automatic or manual control. How is this adjusted? Who controls this?*
* *Provide information on the irrigation pumps. How many pumps are there, what type are they, how are they controlled?*

**Irrigation Areas:**

* *Irrigation type e.g., drippers, wobble sprinklers, pop up sprinklers, impact sprinkler, pivot etc.*
* *Irrigation layout, including expected irrigated area surrounding each sprinkler.*
* *Irrigation pipework details – size, colour, material*
* *Distance from irrigation circles to nearest place of public access e.g., buildings, roads, walkways, playgrounds, or public BBQs.*

# Irrigated crops or vegetation

*Provide a list of the plants that will be irrigated and their intended use. Delete examples/rows below that are not relevant.*

Table 9: Plants irrigated with recycled water and their intended purpose.

|  |  |
| --- | --- |
| **Irrigated plants** | **Intended purpose** |
| Pasture – clover, ryegrass, phalaris | Sheep grazing |
| Lawns – kikuyu and buffalo grass | Municipal use, sporting field |
| Native shrubs and grasses | Ornamental, greening |
| Fruit Trees – Apples, avocados, cherries, olives | Commercial food crop |
| Cereals – wheat, barley, oats | Commercial food crop |
| Fodder crops - lucerne | Livestock grazing |
| Grape vines | Wine production |
|  |  |

# Irrigation application

*The irrigation requirement of a plant or crop is dependent on the plant species, soil type, and on seasonal/climatic influences such as rainfall and evapotranspiration rates.*

*To ensure that recycled water is irrigated sustainably, provide the planned monthly application rate of the recycled water to the intended irrigation site/s. The planned monthly usage of recycled water is a helpful information for recycled water suppliers to understand, so that they can effectively prepare for low demand periods when storage may be needed.*

*For municipal irrigation sites refer to the* [*Code of Practice for Irrigated Public Open Space*](https://www.sawater.com.au/__data/assets/pdf_file/0020/40493/Code_of_Practice_Irrigated_Public_Open_Space_201015_standard-UPDATED.pdf) *and the* [*Irrigation Management Toolkit*](https://www.sawater.com.au/my-business/services/irrigated-public-open-spaces-ipos/irrigation-management-toolkits)*. which provides guidance on the calculation of irrigation application rates for turf.*

Table 10: Planned Irrigation Application at Oval X

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Irrigation Area** | 1500 | **m2** | 0.15 | **ha** |  |
| **Irrigation Event** | 10 | **mm** | 155 | **kL** |
| **Parameter** | **JAN** | **FEB** | **MAR** | **APR** | **MAY** | **JUN** | **JUL** | **AUG** | **SEP** | **OCT** | **NOV** | **DEC** | **Total** |
| Rainfall (mm) | 19.3 | 23.0 | 17.5 | 19.0 | 27 | 27.1 | 22.4 | 24.3 | 26.5 | 27.0 | 23.2 | 21.2 | 277.5 |
| Irrigation Requirement (kL) | 1278 | 886 | 789 | 394 | 0 | 0 | 0 | 0 | 276 | 555 | 947 | 1151 | 6277 |
| Irrigation requirement (mm) | 80 | 60 | 50 | 30 | 0 | 0 | 0 | 0 | 20 | 40 | 60 | 70 | 4100 |
| No of irrigation events | 8 | 6 | 5 | 3 | 0 | 0 | 0 | 0 | 2 | 4 | 6 | 7 | 41 |

# 7. Hazard identification

*List the health and environmental hazards for recycled water use.*

The major health hazards for recycled water include:

* Microbiological pathogens (viruses, protozoa, bacteria, helminths), and
* Chemicals: inorganic and organic chemicals, pesticides, endocrine disrupters, pharmaceuticals, and disinfection by-products.

For environmental perspective, the Australian Guidelines for Water Recycling identifies the following 9 key environmental hazards found in recycled water: boron, cadmium, chlorine disinfection residuals, hydraulic loading (water), nitrogen, phosphorous, salinity, chloride, and sodium.

# 8. Risk Management

*Identify end use controls that could be implemented to prevent recycled water risks. Edit the table to reflect the risks and control measures for the irrigation system described in this RMP.*

Table 11 lists the end use controls that will be implemented to mitigate the health and environmental risks associated with irrigating recycled water at Oval X and Gardens Y in township Z. Table 11: Risk identification and end use controls applied at Oval X and Gardens Y in township Z.

|  |  |  |  |
| --- | --- | --- | --- |
| **Task** | **Risk events** | **Risk Category** | **End Use Controls / Preventative Measures** |
| Storage of recycled water | Toxic cyanobacteria bloom in open storages and damsRegrowth of pathogens in tanksStagnant / Septic conditions in tanksPublic access to open storagesLeakage of recycled water storages | Health – recycled water quality | * Water balancing to prevent stagnant conditions caused by long storage periods without sufficient flow.
* Water testing in the event of an algal bloom to confirm if the cyanobacteria species growing is toxic. Consultation with DHW in the event of a toxic bloom.
* Regular visual checks of stored water.
* Installation of mixers/aerators/fountains to keep water oxygenated.
* Fencing and signage on open storages to prevent public access.
* Lining of inground recycled storages to prevent leakages
 |
| Irrigation with recycled water | Ingestion of spraysContact with recycled water e.g., irrigated grass or soil. | Health – Public in the vicinity of the irrigated area | * >25m buffer distance between spray irrigated area and publicly accessed areas e.g., roads, walkways, playgrounds, and BBQs
* Night-time irrigation with 4 hrs drying time before irrigated areas are accessed.
* Signage informing ‘Recycled Water in use. Do not drink’ installed at regular intervals on the boundary of the irrigated area and at the entrance to the site.
* Fenced irrigation areas preventing public access.
* Spray drift control: large droplet, low throw sprinklers, inward throwing sprinklers on the boundary, vegetation screen, anemometer switching.
* Drip or subsurface irrigation.
 |
| Ingestion of sprays Contact with recycled water e.g., irrigated grass or soil. | Health – Employees, Visitors, Contractors | * Use of Personal Protective Equipment (PPE)– when handling recycled water irrigation equipment or when touching wet soils or plants that have been irrigated with recycled water.
* WHS Instructions for workers or contractors who could be exposed to recycled water including, but not limited to, the following personal hygiene measures:
	+ Avoid consumption of recycled water and unnecessary exposure to sprays and aerosols.
	+ Wash hands with soap and clean water after potential contact with recycled water, eating, drinking, or smoking.
	+ Cover wounds, open cuts, or broken skin.
 |
| Backflow of recycled water into drinking water via cross connection.  | Health – Public: Drinking water | * Backflow prevention devices or air gaps installed on cross connections with the recycled water network.
* Hydraulic plan approved by the OTR.
* Alignment with the plumbing code and non-drinking water guidelines.
 |
| Consumption of irrigated produce (Commercial Food Crops)  | Health – Public: Consumers or irrigated produce | * Cooking or processing of produce before consumption (e.g., cereal, wine)
* Removal of skins from produce before consumption (e.g., avocado, banana)
* Drip irrigation with limited or no ground contact (e.g., tomatoes, capsicums)
* Drip irrigation of raised crops with no ground contact (e.g., apples, apricots, grapes)
* Subsurface irrigation of above ground crops.
* Withholding periods between harvest and sale.
 |
| Excessive irrigation causing run-off, pooling or groundwater infiltration.Nutrient build-up in irrigated soilsSalinisation of soilsContamination of waterways or groundwater | Environment | * Planned irrigation application based on rainfall, evapotranspiration rates, soil, and vegetation characteristics.
* Review of recycled water quality results to inform if the irrigation application rates are suitable.
* Application of a leaching fraction or freshwater application if soil salinity increases.
* Irrigation applied on slope <10%.
* Regular soil testing (~2-5 years) to review soil health.
* Soil moisture probes used to control irrigation application.
* >50m buffer between irrigation area and waterways.
 |

# 9. Supporting Documents

*Provide diagrams, photos or marked up aerial images showing the following:*

* *Buffer distances between the irrigation area and public areas (walkways, roads, playgrounds, BBQs) and natural waterways e.g., rivers/creeks*
* *Image of the face of the recycled water signs installed and a markup showing the location where they’re installed around the irrigation site.*
* *Location of fencing (if installed)*
* *Location of recycled water meter, irrigation pumps and onsite storages.*