Rosehill Network Pty Ltd

ACN 131 213 691

RRWS-IMS-DOC-003
Water Quality Management Plan

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Contents

1. Introduction

Rosehill Network Pty Ltd ('**Rosehill Network**') holds Network Operator's Licence number 09_002 issued under the *Water Industry Competition Act 2006* (NSW) ('**WICA**') under which it owns water infrastructure that forms part of the Rosehill Recycled Water Scheme ('**Rosehill Scheme'**). This document, Rosehill Network's Water Quality Management Plan ('**WQMP**'), has been developed to satisfy the requirements of the *Water Industry Competition (General) Regulation 2008* (NSW).

1.1 Rosehill Scheme Overview

The Rosehill Scheme involves:

- extracting secondary treated effluent from Sydney Water's Liverpool to Ashfield Pipeline ('**LAP**');
- treating the effluent to produce high quality recycled at the Fairfield Advanced Water Treatment Plant ('**Plant**'); and
- transporting recycled water from the Plant, through a distribution network ('**Network**') to customers in the Fairfield, Cumberland, and Parramatta local government areas ('**Customers**').

The scope of the Rosehill Scheme is shown in **Annexure A**.

The Rosehill Scheme is underpinned by a 20-year Project Agreement between AquaNet Sydney Pty Ltd ('**AquaNet**') and Sydney Water and is capable of delivering up to 25 million litres of recycled water per day to Customers.

Under the Project Agreement, AquaNet delivers recycled water to Sydney Water for the sale to its own customers ('**Foundation Customers**'). Sydney Water has retail contracts with the Foundation Customers. Sydney Water supplies up to 32ML/d of treated effluent (according to an effluent specification in the Project Agreement) to the Plant from the LAP. AquaNet may sell any water in excess of that required to supply the Foundation Customers directly to its own customers ('**Non-Foundation Customers**').

AquaNet owns the Plant and has entered into an Operation and Maintenance Agreement with Veolia Water Australia Pty Ltd ('**Veolia**' or '**VWA**') who is responsible for maintaining and operating the Plant.

Rosehill Network and its sister company, AquaNet, have entered into a Pipelines Agreement whereby Rosehill Network constructed and owns the Network. Rosehill Network has entered into an Operation and Maintenance Agreement with Veolia who is responsible for maintaining and operating the Network.

Both Rosehill Network and Veolia hold Network Operator Licences under WICA.

The contractual structure of the Rosehill Scheme is depicted in **Annexure B**.

AquaNet and Rosehill Network are both part of the Water Utilities Australia group of companies ('**WUA**') and through its various subsidiaries, WUA provides the resources, skills and expertise required for AquaNet and Rosehill Network to deliver the Rosehill Scheme.

2. Executive Summary

2.1 Purpose

This WQMP has been developed for the Rosehill Scheme and is to be read in conjunction with the Veolia Document, ***MAN-3954-4 Operations Management Plan – Rosehill Recycled Water Scheme*** (OMP), which provides an overview of the plant's Integrated Business Management System (IBMS).

This WQMP together with OMP address the 12 elements of the framework for the management of recycled water quality and use, as detailed in the Australian Guidelines for Water Recycling.

Throughout both of the documents specific references are provided to relevant procedures, work instructions and other documents that all together form the FAWTP Management System.

Detailed references are provided in the Veolia Document, ***TEM-3978-1 WICA Requirements Reference Table***.

2.2 Expertise in producing and maintaining recycled water quality

2.2.1 Design, Management and Regulation

At the commencement of the scheme AquaNet oversaw the RRWS through two major subcontracts for the Plant and Network as follows:

- Plant Agreement: Veolia was responsible for owning, designing, constructing, maintaining and operating the Plant under a 20 year (2011) agreement with AquaNet Sydney Pty Ltd (AquaNet).
- Pipelines Agreement: Rosehill Network Pty Limited (Rosehill Network) was responsible for owning, designing, constructing, maintaining and operating the Network under a 20 year (2011) agreement with AquaNet.

In 2019 the ownership of AquaNet and Rosehill Network was transferred to Water Utilities Australia (WUA), and consequently the scheme management changed, whereby:

- AquaNetand Rosehill Network, subsidiaries of Water Utilities Australia, wholly owns and is responsible for the overall delivery of the RRWS. Rosehill Network holds the WICA Network Operator's Licence number 09_002 for the operation of the RRWN and AquaNet holds the WICA Retail Supplier's Licence 10_01R for the operation of the RRWS.
- Veolia Water is responsible for the Operation and Maintenance of the Scheme, including both the Plant and Network. Veolia holds the WICA Network Operator's Licence number 09_001 for the operation of the Plant.

Veolia Water is a world leader in water reuse, with over 40 water reuse projects worldwide, recycling over 600 megalitres a day, producing high quality treated water. Veolia Water has extensive experience in creating alternative water resources that will be used for:

- Irrigation for agriculture
- Irrigation of recreational areas, including golf courses and sports fields
- Toilet flushing
- Car washing
- Increasing environmental and river flows
- Industrial reuse: make up water for boilers & cooling towers, process water, cleaning & manufacturing.

2.2.2 Design & Construction

AquaNet engaged Parsons Brinkerhoff (PB), a highly experienced water industry design consultant, to complete the detailed Network design and associated hydraulic modelling. Highly experienced contractors were utilised for construction such as CLM Infrastructure Pty Ltd to install the Network, Tasman Tanks to install the reservoirs and KSB to supply the pumps.

Veolia Water Australia utilised the resources of Veolia Water Solutions and Technologies, to manage the design and construction of the Plant.

Veolia Water Solutions and Technologies has unique technologies that can treat wastewater, bore water, sea water, contaminated water or process water to produce high quality water essential for industrial reuse applications. Veolia Water Solutions and Technologies has designed and built water recycling plants to meet customers' site requirements in the oil & gas, mining, power, food & beverage, municipal and pharmaceutical market sectors.

2.2.3 Operation

Across Australia, Veolia has over 20 long term water operations contracts, involving more than 60 water and wastewater treatment plants. Veolia has more than 865 employees providing water and wastewater services to up to 4 million people in Australia and New Zealand.

2.2.4 Independent Verifier

Sydney Water and AquaNet engaged an independent verifier, Kellogg Brown & Root Pty Limited (KBR), to ensure that the design and construction of the RRWS was delivered according to the specifications that form part of the Project Agreement.

3. Analysis of the Recycled Water

3.1 Recycled Water Quality

3.1.1 Source of Water

The RRWS sources secondary effluent from the Sydney Water Liverpool to Ashfield Pipeline (LAP) as described in the Veolia Document, ***TEM-3819 FAWTP Source Water Characterisation***.

3.1.2 Recycled Water Quality

The Plant treats the secondary effluent from the LAP to produce high quality recycled water to meet the Recycled Water Specification before it is stored in the recycled water storage tank on the Plant site.

Refer to the Veolia Document, ***TEM-3898-1 Recycled Water Specification***, for the parameters that are measured and their targets. The specification also identifies which parameters are monitored on-line and which parameters are tested in the laboratory.

On-line parameters are measured on a continuous basis. All other parameters are measured by the internal and / or external laboratory on a daily, weekly, or monthly basis as specified in the Veolia Document, ***TEM-3799-4 Laboratory Analysis Schedule***.

The recycled water must meet the target parameters 95% of the time as measured on an annual basis. The recycled water must never exceed the limit to trigger product failure.

3.1.3 End Uses

The RRWS supplies Recycled Water to industrial, commercial and residential uses as described in the Veolia Document, ***PRO-3820-3 Rosehill Recycled Water Scheme Overview***.

3.1.4 Routes of Exposure

Routes of exposure include airborne spray from cooling towers, firefighting spray, physical contact with water during manufacturing, inadvertent drinking and contact with finished products.

The routes of exposure for each of these customers have been assessed and are documented in the Veolia Document, ***EXT-3877-1 Customer Exposure Assessment and Health Performance Targets***.

3.1.5 Receiving Environment

The receiving environments of the RRWS include:

- Recycled water customer sites and processes
- The natural environment through irrigation or mains break
- The Sydney Water sewer system through Plant waste stream
- Scour points along the Network that are used to drain or flush the Network during an emergency or a water quality event.

Other end points include air valves and reservoir overflows.

3.2 Recycled Water System

3.2.1 Key Characteristics

The RRWS has the following key components and is depicted in the general diagram below:

- Effluent collection and treatment by Sydney Water and supply to the LAP
- Effluent extraction at the LAP
- Plant (including treatment by reverse osmosis, ultrafiltration, chlorination and other processes)
- Trade waste pumped to the Sydney Water sewerage system
- Network (consisting of pipes, reservoirs and pump stations)
- Potable water connection points
- Customers

A detailed description of the RRWS is provided in the Veolia Document, ***PRO-3820-3 Rosehill Recycled Water Scheme Overview***, and shown in the images below.

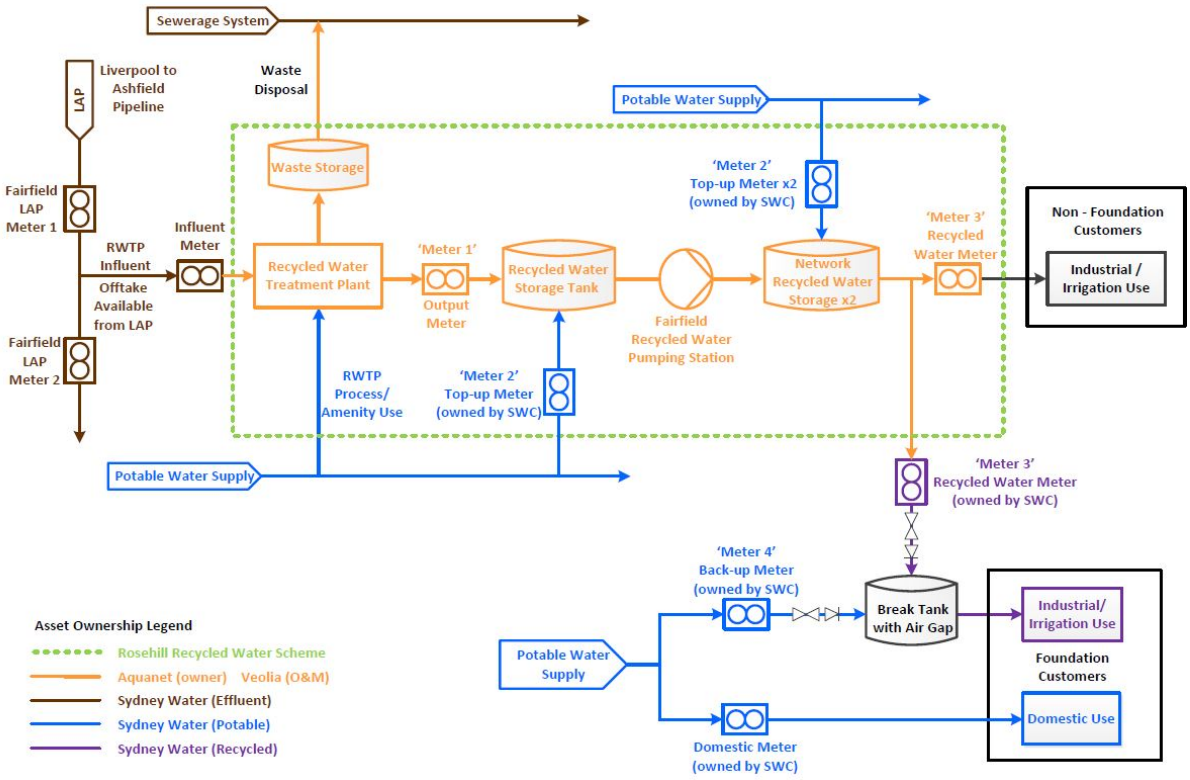


Image 2.1 - RRWS Schematic

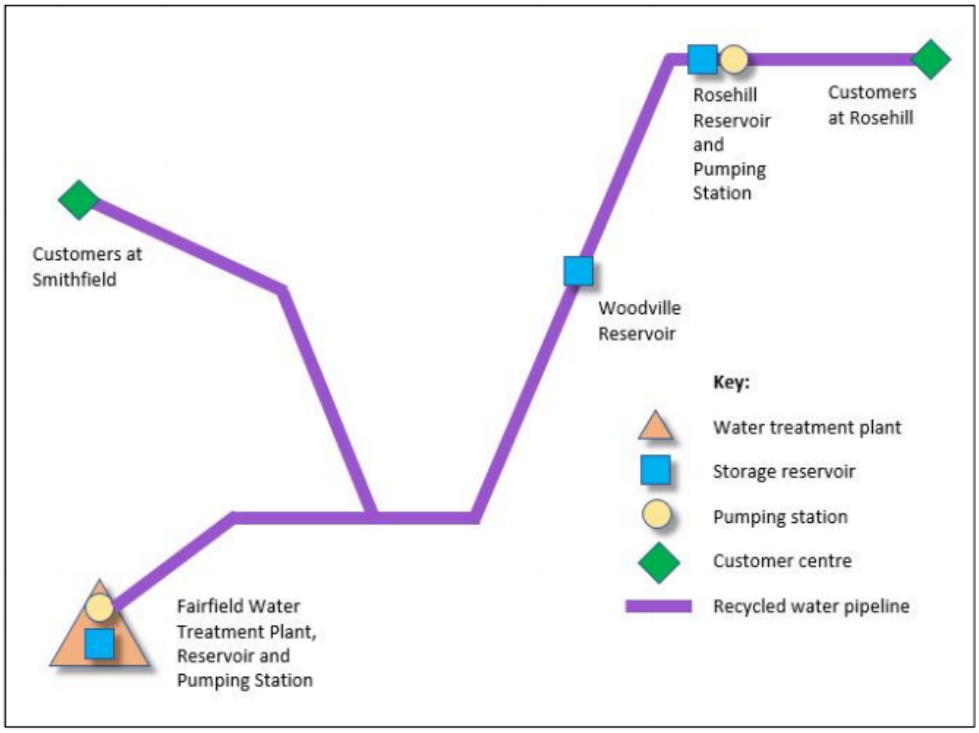


Image 2.2 - RRWN Schematic

Key Components of the Network include:

- Pipelines (PVC, PE, Ductile Iron and Stainless Steel).
- Pump stations (Fairfield & Rosehill).
- Reservoirs (Fairfield, Woodville & Rosehill).
- Online Water Quality monitoring units (Fairfield, Woodville and Smithfield).
- Isolation valves at approximately 1km intervals.
- Air valves at high points in the pipeline.
- SCADA monitoring and control system.
- Communication systems.
- Potable Water connections.
- Scours at low points approximately every 1km along the pipeline.
- Customer meter sets including back flow protection.

3.2.2 System Analysis

Screening Level Risk Assessment

In 2008, in partial fulfilment of the requirements of the 2006 Australian Guidelines for Water Recycling (AGWR) a screening-level (microbial) risk assessment (SLRA) was undertaken by Sydney Water to quantify potential health risks associated with recycled water for the proposed recycled water uses of the RRWS.

The risk assessment did not identify any human health risks that exceeded the acceptable annual risk benchmark of 10-4 (1 additional infection per 10,000 persons per annum), either by the gastrointestinal (ingestion) or respiratory (inhalation) route.

As part of this study a desktop assessment of the required log reductions of microbial pathogens was also undertaken. It was found the predicted log reductions based on the proposed design exceeded those required in the 2006 Australian Guidelines for Water Recycling for industrial, municipal and fire-fighting use, in most cases by many orders of magnitude.

Values of 14 log reduction were estimated for bacteria (target 5.3), 10.55 log for viruses (target 6.5) and greater than 7.25 log reduction for protozoa (target 5.1), ensuring that recycled water was treated fit for its intended application in industry and irrigation as well as fire-fighting.

The SLRA study was undertaken by Dr Michael Storey of Sydney Water, Science and Technology.

Preliminary Risk Assessment and Critical Control Point Identification

Following the SLRA, a Preliminary Risk Assessment was held on the 19th September 2008. Attendees included:

- Narelle Berry – IPART
- Jameel Bhana, Lisa Currie, Paul Dixon – Veolia
- Troy Walker, Annalie Roux – Veolia (Western Corridor)
- Kim Hardy, Catherine Stokes – Jemena
- Richard Shuil, Darren Atkins – Sydney Water
- Linda Gyzen – AquaNet
- Samson Tam –Veolia Water Solutions and Technologies (VWS)

A Preliminary Risk Assessment TEM-3830 was developed as an outcome of this workshop.

As part of the workshop held on 19th September 2008 preliminary Critical Control Points (CCP's) were also identified.

The preliminary risk assessment and CCP identification were used to engineer controls into the RRWS.

A second series of Risk Assessment and CCP workshops were held in September / October 2010. The purpose of these workshops was to confirm the CCP's within the whole RRWS and to identify residuals health and environmental risks that have not been eliminated through Plant design.

The first of the workshops was to confirm the CCP's within the scheme.

Attendees included:

- Narelle Berry – IPART
- Phil Narezzi, Andrew Richardson, Kate Simpson – Veolia
- Charles Edmiston, John McGuinness, Ronald Bean, Melanie Blake - VWS
- Arthur McAuley, Rajesh Gobel – Jemena
- Colin Thompson – AquaNet
- Ron Bouwman– South West Health

The purpose of the second of the two workshops was to undertake a risk assessment to identify any outstanding health and environmental risks.

Attendees included:

- Narelle Berry – IPART
- Ron Bouwman - South West Health
- Phil Narezzi, Andrew Richardson, Kate Simpson – Veolia
- Charles Edmiston, John McGuinness, Ronald Bean, Melanie Blake - VWS

- Rajesh Gobel – Jemena Operations
- Colin Thompson – AquaNet
- Frank Vidovic – Sydney Water

Results of the workshops were recorded in the Veolia Document, ***CRA-VW-ROS-2000-D1 Risk Assessment and Confirmation of CCP***.

3.2.3 Review of System Analysis

The recycled water system analysis will be reviewed annually in conjunction with AquaNet in order to identify and incorporate any changes.

The analysis will also be reviewed following any major scheme expansion or change in end user requirements.

3.3 Recycled Water Quality Data

3.3.1 Historical Data

The source water for the RRWS comes from the catchments of Liverpool and Glenfield STPs, which form part of the Malabar Wastewater System. The two STPs receive both domestic and industrial waste (trade waste).

The design of the plant was based on the analysis of historical operational data from these two catchments.

3.3.2 Assessment of Data

The database generated using the historical data of the raw water sources has been supplemented by the implementation of an onsite data historian. This historian is linked to the plant SCADA system and provides long term storage of plant process data.

4. Preventative Measures for Water Quality Management

4.1 Preventative Measures

4.1.1 Multiple Barrier Approach

In accordance with the AGWR, the RRWS uses a multiple barrier approach to manage hazards in recycled water. Under this approach, a number of sequential processes are used, each of which provides a barrier to one or more hazardous parameters. The multiple barrier approach has a number of advantages:

- Reduced performance of one barrier does not result in a total loss of management;
- It may be possible to temporarily increase the performance of the remaining barriers while remedial action is taken to restore function of the faulty barrier;
- As a combination, multiple barriers produce less variability in performance than single barriers (AGWR).

There are several barriers in the RRWS to ensure that recycled water that does not meet the Quality Specification is not supplied to customers. They are:

- Trade Waste Agreements - Sydney Water effluent collections are covered by trade waste agreements (Sydney Water responsibility)
- Secondary Effluent Feed - Sydney Water treats the effluent to secondary treated effluent standard (Sydney Water responsibility)
- Monitoring of Feed Quality - Effluent is not be allowed into the Plant if the quality falls outside the effluent specification (Veolia responsibility)
- Plant Unit Processes - Unit process barriers within the Plant are such that contaminants are removed in order to meet the Quality Specification (Veolia responsibility). Unit process barriers

are summarised in Table 4.1 below. Full details are given in Table 4.2.

Table 4-1 Summary of Unit Process Barriers

	Ultrafiltration	Reverse osmosis	Ion exchange	Chlorination
Bacteria	☑	☑	☑	☑
Viruses	☑	☑	☑	☑
Parasites	☑	☑	☑	☑

- Quality at Plant Outlet - Recycled water that does not meet the Quality Specification is not allowed to transfer from the Plant into the Recycled Water tank. (Veolia responsibility)
- Network Monitoring - Quality is re-tested as it enters the Network to ensure that it still meets the Quality Specification (Veolia Responsibility). Recycled water that does not meet the Quality Specification is not delivered to the Customers. (Veolia Responsibility).

In all cases SCADA systems are used to monitor water quality and alarms are triggered when quality parameters are drifting towards the limits. This provides operators with time to take corrective action prior to the recycled water falling outside the Quality Specification.

Table 4-2 Summary of CCP Targets and Validation Information Sources, and Expected Performance for the FAWTP.

Critical Process	Hazard Controlled	Virus	Bacteria	Protozoa	Validation Information Source	Expected Performance
1.SWC STP's	Virus, Bacteria, Protozoa	0	0	0	Awaiting correlation from SWC of STP performance vs log removals achieved. Will not claim credit for log removals until data is received.	Raw water quality within Table A of contract specification.
2. UF	Virus, Bacteria, Protozoa	1.5	4	4	Memcor studies, GAP scheme trail (SA) Memcor studies Memcor studies	Target PDT to be set based on commissioning parameters at a level which equates to Bacteria / Protozoa log removal of 4 across the process.
3. RO	Virus, Bacteria, Protozoa	1.1	1.1	1.1	Membrane supplier, Western Corridor Scheme	Gives 1.1 log credit for bacteria, viruses and protozoa based on 1.1 log reduction in conductivity
4. pH Adjustment	Suitable pH for industry. Incorrect pH for disinfection	0	0	0	Process modelling software Published information on disinfectant chlorine vs. pH. pH range setpoint from contract	The pH of the recycled water contractually must be between 6 and 9. The target for pH is 6.6-8.5.
5.Chlorine dosing	Virus, Bacteria, Protozoa	4	4	0	Published information (GC White, 2004) on log reduction vs CT* Residual chlorine setpoint set by the Contract.	Log removal for bacteria is 4 log for CT = 50mins. Residual chlorine setpoint target of 1.0mg/L. Limits to product failure are <0.7mg/L and >5.0mg/L.
Total		7.6	9.1	5.1		
Required		6.5	5.3	5.1		

*CT = concentration * contact time

4.1.2 Additional Preventative Measures

A risk assessment workshop was held in September / October 2010. The purpose of the workshop was to confirm the preventive measures and barriers within the plant and to identify any residual health and environmental risks that were not eliminated through plant design.

The first step of the risk assessment process was to identify hazards and their existing controls in accordance with the Veolia Document, ***PRO-263-5 Risk Management Procedure***.

Following identification, the hazard was assessed with existing controls in place. Based on this, a risk score was generated which was used to assess the adequacy of existing controls.

This procedure was undertaken for each process step in the RRWS.

Results were recorded in the Veolia Document, ***CRA-VW-ROS-2000-D1 Risk Assessment and Confirmation of CCP***.

4.1.3 Document Preventative Measures and Strategies

The definition of process limits for the process barriers is defined in the Veolia Document, ***TEM-3836 HACCP Register***. This document details the alarm and alert limits for each barrier and the corrective actions to be taken if these limits are reached.

4.2 Critical Control Points

4.2.1 Identification of Critical Control Points

A CCP workshop was held in September / October 2010. The purpose of the workshop was to confirm the CCPs within the plant, create critical limits and to develop response plans if these limits are breached.

After completion of the hazard assessment, each treatment step was assessed for its criticality in controlling a specific health or other hazard.

Three types of control points were adopted:

- Critical Control Points (CCP): process points identified to control water quality health hazards.
- Critical Operational Points (COP): points identified to control hazards affecting continuity of supply.
- Quality Control Points (QCP): points identified as impacting on the process train but cannot be monitored online or monitoring point for final product quality where the control may be to dispose of or reprocess non-conforming product.

CCPs and COPs are managed using the same protocol except for reporting of exceedances. CCPs and COPs monitor and identify failures of the barriers that would result in the residual risk of a hazard increasing above the level identified in the risk assessment.

Each barrier that was identified as a control in the risk assessment was assessed for its criticality in controlling the specific hazard.

A full description of critical control points for the plant is given in document HACCP Register TEM-3836.

For more details refer to the Veolia Document, ***MAN-3941-2 Process Operations Plan – Fairfield Recycled Water Plant***.

4.2.2 Establish Mechanisms for Operational Control

Following the identification of CCPs, alert and alarm levels were developed.

The purpose of an alert level is to advise the plant operator that a critical limit is being approached and that corrective action needs to be undertaken to ensure that the critical limit is not breached. Corrective procedures have been developed for alert levels for each CCP identified.

The purpose of an alarm level is to advise the plant operator that a critical limit has been reached and that corrective actions will immediately be undertaken. Corrective procedures have been developed for alarm levels for each CCP identified. These procedures will typically include automatic shutdown of plant equipment to minimise the impact of the CCP breach.

Summary screens on SCADA allow the plant operator to readily review the status and set points of CCP alert and alarm limits.

Details of the critical controls points along with their alert and alarm limits are given in the Veolia Document, ***TEM-3836 HACCP Register***.

5. Verification of Recycled Water Quality

5.1 Recycled Water Quality Monitoring

5.1.1 Characteristics to be monitored

The characteristics to be monitored throughout the Plant have been identified and defined by several documents and studies. These include:

- Project Agreement
- O&M Agreement
- Water Quality Risk Assessment
- HACCP analysis

5.1.2 Operational plan

Based on the requirements of the documents listed in Section 4.1.1 an overarching Veolia Document has been developed, ***MAN-3941-2 Process Operations Plan – Fairfield Recycled Water Plant***.

The Veolia Document, ***TEM-3799-4 Laboratory Analysis Schedule***, details the location and frequency of sampling to be undertaken on site. The Process Operations Plan also details how analysis results will be managed to ensure that it is representative and reliable.

IPART will be notified in the event of any significant changes being made to this sampling plan.

5.1.3 Documentation and training

A number of procedures and work instructions have been developed to support the implementation of the Process Operations Plan, and to ensure consistency in sampling and reporting.

All VWA Operators have been trained in these procedures.

5.2 Recycled Water Users

5.2.1 Enquiry and Response for Customers

Customer enquiries are handled in accordance with the Veolia Document, ***PRO-3915-3 Stakeholder Engagement and Evaluation Procedure***.

Veolia customer complaints are handled in accordance with the Veolia Document, ***PRO-3916-2 Handling Complaints Procedure***.

5.2.2 Customer Satisfaction and Communication

A quarterly report covering water quality is provided to Customers. Customer participation in the RRWS is optional. The RRWS is dependent on Customers continuing to use Recycled Water as the sole source of revenue for the Scheme.

Regular communication with Customers is undertaken by AquaNet in accordance with the agreed terms of the recycled water supply agreement.

Any feedback from individual Customers is considered seriously by Veolia and AquaNet and improvements implemented to the extent that they are commercially viable and fit in with requirements of the other Customers.

5.3 Recycled Water Quality Reporting

Internal and External Reporting takes place on a regular basis in accordance with the Veolia Document, ***PRO-3816-2 Internal and External Reporting Procedure***.

6. Validation, Research and Development

6.1 Validation Processes

Validation of the Fairfield Advanced Water Treatment Plant was undertaken in accordance with the Veolia Document, ***PL-FAI-20-2924-1 Validation Plan for Rosehill Recycled Water Treatment Plant***.

The objective of the validation was to ensure that hazards originally identified by the HACCP team were complete and correct and that they were being effectively controlled under the proposed HACCP plan.

The following HACCP principles were validated:

Hazard Analysis	Validate that all major risks have been identified Validate that the risks have been correctly rated and ranked Validate the efficiency of the process barriers as control measures
Identification of Control Points	Validate that there are CCPs for all significant hazards Validate that the CCPs are at appropriate stages of the process
Critical limits	Validate that the critical limits control the hazards
Monitoring of Control Points	Validate that the monitoring system will ensure that the control measure at the CCP is efficient
Corrective Actions	Validate that the Corrective Action procedures will prevent non-conforming water from reaching the consumer.

6.2 Change in Conditions and New Equipment

Processes are revalidated when changes to conditions, process equipment or operating protocol occur in accordance with the Veolia Document, ***PRO-3807-1 NSW Water – Change Management Procedure***.

In the event of significant changes, a new process validation plan will need to be developed if it has any effect on the integrity and reliability of the process.

6.3 Design of equipment

Validation of the Fairfield Advanced Water Treatment Plant was undertaken in accordance with the Veolia Document, ***PL-FAI-20-2924-1 Validation Plan for Rosehill Recycled Water Treatment Plant***.

6.3.1 Validation of Equipment and Infrastructure

This procedure outlines a 4 step approach to the validation of new equipment and infrastructure:

1. Desktop Validation

The FAWTP process was validated at the desk top level to quantify its ability to achieve the required water quality objectives.

2. Validation of the Process by Pilot Plant Testing

A pilot plant representative of the Fairfield Advanced Water Treatment Plant was built prior to the plant design and construction to validate the choice of process technologies.

The pilot plant studies allowed confirmation that the FAWTP process could achieve the required recycled water quality based on the design basis feed effluent quality.

3. Validation of the Process Efficiency from the Literature

Further supporting the pilot plant results, sources of information available from literature and manufacturers were compiled in order to validate the efficiency of each treatment barrier and CCP at the FAWTP. This information will be submitted to the Validation team during the validation workshop for review.

4. Design Review

The FAWTP design was also reviewed by an independent reviewer with experience in water treatment. The consulting company selected for the independent review was KBR.

6.3.2 Validation of Process

The validation of the efficiency of the barriers for the FAWTP was undertaken using a two part process:

1. Process Proving

The first part consisted of the individual Process Unit Proving Tests which was conducted during the commissioning phase of the FAWTP during April to June 2011.

The Process proving was conducted between 14 August and 25 August 2011. During the performance trial, the plant was required to operate under normal operating conditions to produce 20 ML/d or a lower pro-rata volume if insufficient feed was available to the plant to produce 20 ML/d. The performance trial was scheduled to take place over 10 consecutive days.

The Product water quality was monitored during these periods to validate the efficiency of the process steps to remove satisfactorily contaminants and hazards identified in the risk assessment.

2. Validation Workshop

A validation workshop was held on Wednesday 14 September 2011 at the FAWTP and was facilitated by the AWTP plant manager, Andrew Richardson. The purpose of the workshop was to review the HACCP process and to validate the effectiveness of the HACCP system in place.

The members of the validation team were Anne Caillon (Design and Construction Process Engineer), Kate Simpson (Operations Process Engineer), Andrew Richardson (Operations Manager), Colin Thompson (AquaNet Representative), Paul Cousins (Design and Construction Control Systems Engineer), and Troy Walker (Technical Manager).

After the workshop, it was concluded that:

- All major risks to human health and/or the environment posed by the recycled water have been identified, rated and ranked and that control measures have been put in place to control these.
- A system of critical control points has been put in place to control recycled water quality and ensure that it is of a quality that does not pose a hazard to human health and/or the environment.
- The critical limits selected are appropriate to the hazards and will ensure control of recycled water quality.
- The plant, operating normally, will not breach the critical limits, as demonstrated during the plant performance trial.
- Systems are in place to ensure that if the plant operating conditions approach the critical limits, automated corrective actions will take place to ensure that no water produced with any critical limit breached will reach the recycled water network.

6.4 Investigation studies and research monitoring

Following commissioning of the plant, process data from the SCADA is being recorded to a plant historian database.

This data is analysed to identify any emerging trends, and to develop improved operating protocols to treat the LAP secondary effluent.

A dedicated process engineer is a member of the plant team. A key part of that role is process optimisation based on process data review. The site process engineer is supported by the Engineering department at VWA's corporate offices in Pyrmont and more broadly by the extensive technical knowledge of recycling available within VWA and in Veolia Water worldwide.

VWA implements a variety of knowledge transfer techniques to ensure that the staff at each of its operations can benefit from pertinent knowledge from other sites and from research and development projects. In 2010, for example, a "lessons learned" workshop in water recycling was conducted at the Bundamba Advanced Water Treatment Plant in Brisbane, gathering technical staff from eight reuse and membrane plants to share lessons in water recycling.

Technical staff from Veolia's operations worldwide also frequently visit Australia and present technical information from other sites. Technical information sharing is also available through an on-line knowledge transfer network.

Veolia Water also has an extensive research and development program worldwide, with Australia being a key hub for research in recycling and membrane processes. This includes the co-funding of a Chair of Water Recycling at the University of Queensland.

7. Operator, Contractor and User Awareness

7.1 Recycled Water Quality Awareness

7.1.1 Operator and Contractor Awareness

Base level process and operations training provides new operators with a minimum level of training required to understand and operate the Fairfield plant.

All contractors are required to undertake a site specific induction providing awareness and outlining the requirements for water quality. The contractors are engaged with the Fairfield site in accordance with the Veolia Document, ***MAN-3954-4 Operations Management Plan – Rosehill Recycled Water Scheme***.

7.1.2 End User Awareness

Sydney Water conducted a training and awareness forum for foundation customers in September 2010. The forum included Jemena, Veolia Water and specialists in implementation of recycled water guidelines.

AquaNet also held a breakfast for potential customers that included a detailed description of the RRWS, and overview of the recycled water treatment process and case studies from the foundation customers.

Further one on one enquiry and response meetings were conducted between AquaNet and potential customers during the process of negotiating recycled water supply agreements.

During the process of finalising the recycled water supply agreements, customers were provided with the following information:

- Recycled water quality specification,
- Approved end uses list and
- RO Water Briefing paper (technical paper on RO recycled water), it's uses and precautions needed in relation to materials being used.

7.2 User Consultation Strategy

AquaNet, ensures that customers are actively involved in water quality issues through the initial water quality education process that forms part of the recycled water supply agreement negotiation process and through the regular quarterly reporting that forms part of the recycled water supply agreements.

Individual customers have limited ability to influence a change in the Quality Specification, however constructive suggestions are taken on board and all customers will be consulted before any proposed change to the Quality Specification by the RRWS proponents. Customers confirmed agreement with the Quality Specification and the terms of supply through execution of their recycled water supply agreement.

Ongoing communication with customers is in accordance with Communication Protocol that forms part of the recycled water supply agreements and in accordance with the Veolia Document, ***PRO-3915-3 Stakeholder Engagement and Evaluation Procedure***.

7.3 Promotion of Benefits of Recycled Water Use

The RRWS is an innovative project in which both Aquanet and Veolia are actively marketing in public forums, seminars, and through brochures and company websites. Any opportunity to promote the RRWS is welcomed by Aquanet and Veolia.

Listing of the benefits of recycled water use forms part of all promotional opportunities.

7.4 Unintended Use

All recycled water equipment in the RRWS and on customer sites is clearly and permanently labelled with safety signs that follow the current version of the Safety Signs for the Occupational Environment standard AS/NZS 1319.

Recycled water pipe work has colour coding that conforms to the guidelines for recycled water in the NSW Code of Practice for Plumbing and Drainage 2006. Signs advising of the use of recycled water on site and induction training help prevent unauthorised use. These measures ensure that customer employees, site visitors and other stakeholders are aware that the recycled water is 'not for drinking'.

7.5 Unauthorised Uses

The recycled water supply agreements clearly state authorised specific end uses for each customer. It is a condition of the agreements that customers take responsibility for ensuring that:

- They restrict recycled water use to these specific uses
- Take the backflow and cross connection precautions as defined by the Water Supply Code of Australia (WSA).

Unintended and unauthorised end uses are most likely to be as a result of accidental cross connection of the Network or Customer recycled water systems with the potable water network. This risk is mitigated through measures such as

- Dial Before You Dig (DBYD) providing advice to workers working in the vicinity of the Network
- Customer site inductions and signs at the entrance to Customer Sites informing visitors (including plumbers) that recycled water is in use
- A requirement in the recycled water supply agreements for installation of recycled water systems by customers to comply with the NSW Plumbing and Drainage code

Licensed plumbers are used for all new connections to ensure that cross contamination does not occur in the Network.

8. Terms and Definitions

Term	Definition
Consequence	The outcome of an event expressed qualitatively or quantitatively, being a loss, injury, disadvantage or gain. There may be a range of possible outcomes associated with an event.
Codes	Mandatory industry codes, and voluntary industry codes with which the organisation chooses to comply.
Compliance	Ensuring that the requirements of laws, regulations, industry codes and organisational standards are met.
Organisational standards	Any code of ethics, codes of conduct, good practices and charters that an organisation may deem to be appropriate standards for its day-to-day operations.
Project	The complete project.
Hazard	A source of potential harm or a situation with a potential to cause loss.
Likelihood	A qualitative description of probability or frequency
Risk	The chance of something happening that will have an impact upon objectives. It is measured in terms of consequence and likelihood.
Risk assessment	The overall process of risk analysis and risk evaluation
Risk management	The culture, processes and structures that are directed towards the effective management of potential opportunities and adverse effects.

9. Veolia Reference Documents

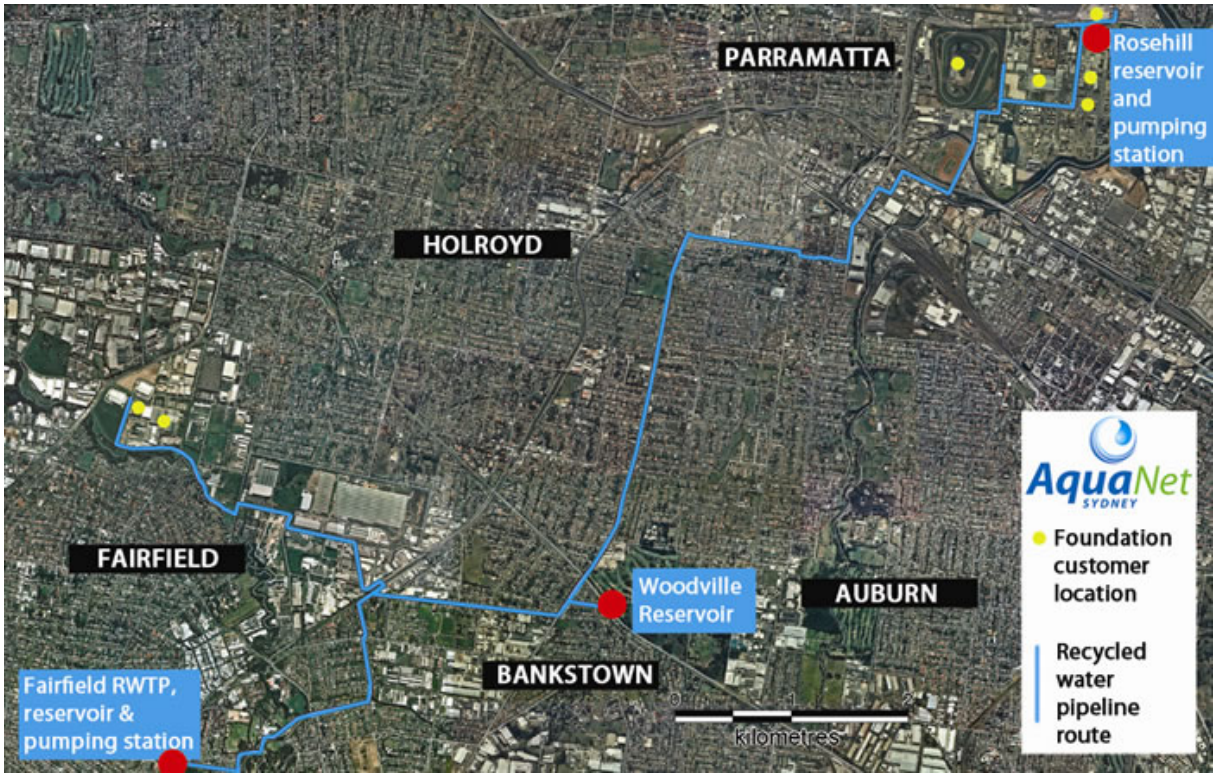
Document Code/ Reference	Document Name
TEM-3978	WICA Requirements Reference Table
PRO-3819	FRWP Source Water Characterisation
TEM-3899	Feed Water Specification
TEM-3898	Recycled Water Specification

TEM-3799	Laboratory Analysis Schedule
PRO-3820	Rosehill Scheme Overview
TEM-3830	Preliminary Risk Assessment and Critical Control Point Identification
MAN-3954	Operations Management Plan
PRO-263	Risk Management
TEM-3836	HACCP Register
MAN-3941	Process Operations
MAN-3935	I & E Management Manual
PRO-3915	Stakeholder Engagement and Evaluation
PRO-3916	Handling Complaints
PRO-3816	Internal and External Reporting
MAN-3813	Validation
PRO-3817	Change Management

10. Abbreviations

AGWR	Australian Guidelines for Water Recycling
AquaNet	AquaNet Sydney Pty Ltd
FAWTP	Fairfield Advanced Water Treatment Plant
HACCP	Hazard analysis and critical control point
IBMS	Integrated Business Management System
LAP	Liverpool to Ashfield Pipeline
PLC	Programmable logic controller
RO	Reverse osmosis
Rosehill Network	Rosehill Network Pty Ltd
RRWS	Rosehill Recycled Water Scheme
RRWN	Rosehill Recycled Water Network
SCADA	Supervisory Control and Data Acquisition system
SLRA	Screening Level Risk Assessment
STP	Sewerage Treatment Plant
SWC	Sydney Water Corporation
VWA	Veolia Water Australia
VWS	Veolia Water Technologies and Solutions

Annexure A – Overview of the Rosehill Scheme



Annexure B – Rosehill Scheme Contractual Framework