



Cobbitty Consulting
Engineering and Advisory Services

WICA Audit Report to IPART

Licence No. 10_008: Veolia (Darling Walk) Non Potable Water Scheme

Licence Plan Audit (Recycled Water Quality Plan)

Independent Pricing and Regulatory Tribunal
Water Industry Competition Act 2006

Network Operator's Licence Audit Report

Licence Holder: Veolia Water Solutions and Technologies (Australia) Pty Ltd

Document Version 5, prepared 28 July 2019

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1. Executive Summary

1.1 Auditor declaration

This report presents the findings of a Licence Plan audit undertaken for the Independent Pricing and Regulatory Tribunal (IPART) under the *Water Industry Competition Act 2006*.

The auditor was provided with sufficient and appropriate evidence, as described in *IPART Audit Guideline Water Industry Competition Act 2006* (September 2018), on which to base the conclusions reached during the audit. The auditor observed the requirements of these guidelines and the audit deed in conducting the audit, determining audit findings and preparing the report.

The audit report findings accurately reflect the professional opinion of the auditor. The findings have not been unduly influenced by the Licensee or any of its associates and express the auditor's opinion as to whether the Licensee has met the licence conditions and regulatory requirements as specified in the scope. A summary of the audit findings is given in the following chapters and a detailed breakdown of the full audit findings against the audited criteria is given in the appendices.

1.2 Audit scope

The subject matter of this audit was compliance of Veolia Water Solutions and Technologies (Australia) Pty Ltd (VWST) and its *Water Quality Plan (non-potable water)* with the requirements of the *Water Industry Competition Act 2006* and the *Water Industry Competition (General) Regulation 2008* as it relates to the supply of non-potable (recycled) water to the Darling Walk Development, Darling Harbour, Sydney under Network Operator's Licence No. 10_008.

In addition the audit assessed compliance of VWST with a WICA section 16 Order.¹ Part of the Order required the auditor to assess the adequacy of the *Water Quality Plan (non-potable water)* (abbreviated to WQP (npw) and often referred to within this report as the *Water Quality Plan*) to assess whether the WQP (npw), including the process flow diagram, was revised to:

- (a) fully and accurately reflect the treatment plant operating arrangements that are currently in place; and
- (b) include measures to ensure that historical flow data for treated water discharged from the treatment plant, or similar alternative information, is retained as evidence to demonstrate that out-of-specification water has not been delivered into supply, in particular, flow monitoring downstream of the diversion of out-of-specification water back to the treatment train or records of the open or close status of valves at the diversion point.

In addition, the audit assessed feedback from NSW Health provided to VWST in an email dated 31 May 2019 that set out the following requests:

- Review role and name of NSW Health. This is inconsistent between section 9 and section 11.1.2.
- Review section on incidents. Section 11.6 does not detail potential incidents (for example would exceeding a critical limit be captured?). Also it does not include contact details of relevant agencies to be notified in an incident. The Appendix 2 contact list does not include the PHU.
- Review the PFD. It doesn't easily identify CCPs. Have any bypasses been captured?
- The risk assessment in section 11.2.4 could be reviewed. It is unclear if that is the complete risk assessment.
- Review CCPs and confirm they are operational and appropriate:
 - Section 11.2.4 mentions UV reactor monitoring and response to UVT. This is not in the CCP table in section 11.5.1.
 - The CCP table in 11.5.1 shows potential critical limits, are these in place?
- In 11.5.1 the free chlorine in the treated water is listed as 0.2-2 mg/L as the range for 'potential critical limits'. What is the C.t. achieved with 0.2 mg/L? The plan claims 4 LRV for bacteria and virus.

¹ IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

In conducting this audit, the auditor considered a copy that was provided of the most recent operational audit report.²

1.3 Major findings

The Licensee (VWST) was found to have documented the arrangements in relation to the design, construction, operation and maintenance of the recycled water scheme in full compliance with the assessed audit criteria with the exception of the following:

- **Table A.1 WQP (npw) element one: The WQP (npw) shows a commitment to responsible use and management of recycled water quality – Non-compliant (non-material):**

The stakeholder information was broadly compliant but lacked sufficient specific details in relation to NSW Health, IPART and JLL to be compliant. VWST was able to find some of those details by the time of final reporting but hadn't fully updated the *Water Quality Plan* to include all of those details and, as such, a non-material non-compliance is reported.

- **Table A.2 WQP (npw) element two: The WQP (npw) The WQP (npw) includes an analysis of the recycled water system – Non-compliant (non-material):**

The *Water Quality Plan* had not been fully revised to comply with the WICA section 16 Order³ to:

- a) fully and accurately reflect the treatment plant operating arrangements that are currently in place; and

The non-compliance was considered non-material given that in practice the relevant valves, SCADA systems, meters and pipelines had been constructed to manage the risk.

- **Table A.3 WQP (npw) element three: The WQP (npw) outlines the preventive measures for water quality management – Non-compliant (non-material):**

It's not entirely clear from the documentation if the two product water tanks are in or out of scope for VWST nor how, and to what extent, VWST should take responsibility for ongoing oversight of activities by JLL, or whether that is considered completely out of scope of the licence. Whilst this lack of clarity wasn't considered to represent a material risk to public health, it is considered to represent a non-material non-compliance.

- **Table A.6 WQP (npw) element six: The WQP (npw) includes details on the management of incidents and emergencies – Non-compliant (non-material):**

The incident information requirements were broadly compliant but lacked sufficient specific details in relation to NSW Health, IPART and JLL to be deemed fully compliant. VWST was able to find some of those details by the time of final reporting but hadn't fully updated the *Water Quality Plan* to include all of those details and, as such, a non-material non-compliance is reported.

- **Table A.9 WQP (npw) element nine: The WQP (npw) outlines the validation, research and development processes for the scheme – Non-compliant (non-material):**

The validation information is broadly compliant but lacked sufficient specific detail and currency to be compliant with modern standards of validation. VWST was able to find some of those details by the time of final reporting and was able to demonstrate that the non-compliances were not material, but it hadn't updated the *Water Quality Plan* to include sufficient information on all of those details and still had some outstanding actions to complete and, as such, a non-material non-compliance is reported.

- **Table A.10 WQP (npw) element ten: The WQP (npw) outlines the process for management of documentation and records as well as the reporting requirement – Non-compliant (non-material):**

² Cobbitty Consulting, *Veolia (Darling Walk) Non-Potable Water Scheme, 2018 Operational Audit Version 4.1*, 12 March 2019.

³ IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

The *Water Quality Plan*, including the process flow diagram and SCADA screens, have yet to be fully revised to comply with the WICA section 16 Order⁴ to:

- b) include measures to ensure that historical flow data for treated water discharged from the treatment plant, or similar alternative information, is retained as evidence to demonstrate that out-of-specification water has not been delivered into supply, in particular, flow monitoring downstream of the diversion of out-of-specification water back to the treatment train or records of the open or close status of valves at the diversion point.

The non-compliance was considered non-material given that in practice records from the SCADA system were shown to prove that it was working.

With the exception of the above, in the opinion of the auditor, VWST's *Water Quality Plan (non-potable water)* adequately documents the arrangements in relation to the design, construction, operation and maintenance of the recycled water treatment plant and associated infrastructure that is to be operated under Network Operator's Licence No: 10_008. With the exception of the above, the documented arrangements are adequately compliant with the relevant guidelines, standards and legislative requirements.

1.4 Recommendations

To achieve full compliance, it is recommended that:

- **REC-DW-2019.01:**
 - VWST should update its *Water Quality Plan*, either through modifying the Plan, or adding a reference to one or more explicitly cited documents, such that it is very clear precisely:
 - who is the point of contact among key stakeholders;
 - how they are to be engaged; and
 - via what contact details.
 - The relevant NSW Health Water Unit, Public Health Unit, JLL and IPART entities should, as a minimum, be covered.
- **REC-DW-2019.02:**
 - VWST should update its *Water Quality Plan* which should be fully revised to comply with the WICA section 16 Order⁵ to:
 - a) fully and accurately reflect the treatment plant operating arrangements that are currently in place.
- **REC-DW-2019.03:**
 - VWST should firmly clarify with Sydney Water, JLL and IPART the precise limits of its responsibility under its Network Operator's Licence (as well as its contract to JLL and its sewer mining agreement with Sydney Water).
 - The precise point of handover between Sydney Water, VWST and JLL should be identified from the perspective of infrastructure and, if distinct, water quality and risk management.
 - The extent of infrastructure considered to be covered under the licence should be precisely clarified with IPART as should the extent, if any, to which VWST should go beyond that infrastructure scope in relation to the oversight, management and reporting on upstream (e.g. trade waste) or downstream (e.g. plumbing and awareness controls) water quality risk management. As a minimum, unless otherwise agreed with IPART, VWST may be responsible for ensuring that water quality doesn't deteriorate in the treated water storages. Furthermore, VWST may be responsible for ensuring and providing evidence that JLL has ensured that customer's plumbing installations

⁴ IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

⁵ IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

were compliant during construction and continues to do so as plumbing systems become modified over time.

- **REC-DW-2019.04:**

- VWST should update its *Water Quality Plan*, either through modifying the Plan, or adding a reference to one or more explicitly cited documents, such that it is very clear precisely:
 - who is to be notified;
 - via what contact details;
 - by what mechanism;
 - under what circumstances;
 - by whom from VWST; and
 - within what timeframe,in relation to clearly defined triggers relating to what constitute water quality incidents and emergencies, for the licenced infrastructure.
- The relevant NSW Health Water Unit, Public Health Unit, customer and IPART entities should, as a minimum, be covered in the notification process or procedure.
- The process should be robust to persons being on leave or out of contact, very clear and explicit, readily available and as unambiguous as reasonably practicable, and suitable for use during incident situations.
- The procedure should be subjected to testing and evaluation and mechanisms should be put in place to keep it up to date.

- **REC-DW-2019.05:**

- VWST should update its *Water Quality Plan*, either through modifying the Plan, or adding a reference to one or more explicitly cited documents, such that it is very clear precisely which documents, and versions of those documents, are relied upon to provide validation.
- In relation to the membrane, the explicit citations need to be added although the evidence available to VWST appears sufficient.
- In relation to the UV disinfection system the evidence appears sufficient but:
 - the specific lower limiting UVT needs to be documented and cited; and
 - a detailed explanation of why online UVT monitoring is not required should be added to justify not having a UVT measurement online to ensure that the UV disinfection system is operating within its validated UVT range.
- In relation to the chlorine dosing system, a reasonable basis should be given to explain the adequacy of the chlorine dose, given the temperature, pH, turbidity, contact time and chlorine concentration dynamic range of operation and the target pathogen under consideration.

- **REC-DW-2019.06:**

- VWST should update its *Water Quality Plan* which should be fully revised to comply with the WICA section 16 Order⁶ to:
 - b) include measures to ensure that historical flow data for treated water discharged from the treatment plant, or similar alternative information, is retained as evidence to demonstrate that out-of-specification water has not been delivered into supply, in particular, flow monitoring downstream of the diversion of out-of-specification water back to the treatment train or records of the open or close status of valves at the diversion point.

⁶ IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

2. Introduction

2.1 Objective

This report presents the findings of a Licence Plan audit undertaken for the Independent Pricing and Regulatory Tribunal (IPART) under the *Water Industry Competition Act 2006*.

2.2 Audit scope

The subject matter of this audit was compliance of Veolia Water Solutions and Technologies (Australia) Pty Ltd (VWST) and its *Water Quality Plan (non-potable water)* with the requirements of the *Water Industry Competition Act 2006* and the *Water Industry Competition (General) Regulation 2008* as it relates to the supply of non-potable (recycled) water to the Darling Walk Development, Darling Harbour, Sydney under Network Operator's Licence No. 10_008.

In addition the audit assessed compliance of VWST with a WICA section 16 Order.⁷ Part of the Order required the auditor to assess the adequacy of the *Water Quality Plan (non-potable water)* (abbreviated to WQP (npw) and often referred to within this report as the *Water Quality Plan*) to assess whether the WQP (npw), including the process flow diagram, was revised to:

- (c) fully and accurately reflect the treatment plant operating arrangements that are currently in place; and
- (d) include measures to ensure that historical flow data for treated water discharged from the treatment plant, or similar alternative information, is retained as evidence to demonstrate that out-of-specification water has not been delivered into supply, in particular, flow monitoring downstream of the diversion of out-of-specification water back to the treatment train or records of the open or close status of valves at the diversion point.

In addition, the audit assessed feedback from NSW Health provided to VWST in an email dated 31 May 2019 that set out the following requests:

- Review role and name of NSW Health. This is inconsistent between section 9 and section 11.1.2.
- Review section on incidents. Section 11.6 does not detail potential incidents (for example would exceeding a critical limit be captured?). Also it does not include contact details of relevant agencies to be notified in an incident. The Appendix 2 contact list does not include the PHU.
- Review the PFD. It doesn't easily identify CCPs. Have any bypasses been captured?
- The risk assessment in section 11.2.4 could be reviewed. It is unclear if that is the complete risk assessment.
- Review CCPs and confirm they are operational and appropriate:
 - Section 11.2.4 mentions UV reactor monitoring and response to UVT. This is not in the CCP table in section 11.5.1.
 - The CCP table in 11.5.1 shows potential critical limits, are these in place?
- In 11.5.1 the free chlorine in the treated water is listed as 0.2-2 mg/L as the range for 'potential critical limits'. What is the C.t. achieved with 0.2 mg/L? The plan claims 4 LRV for bacteria and virus.

In conducting this audit, the auditor considered a copy that was provided of the most recent operational audit report.⁸

⁷ IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

⁸ Cobbitty Consulting, *Veolia (Darling Walk) Non-Potable Water Scheme, 2018 Operational Audit Version 4.1*, 12 March 2019.

2.3 Licensee's infrastructure, systems and procedures

The infrastructure, systems and procedures audited were those related to the recycled water treatment plant and associated infrastructure that form part of the Darling Quarter recycled water treatment plant (refer http://www.veoliawatertechnologies.com.au/media/case-studies/case_darling.htm). More specifically, the infrastructure comprises:

- a sewerage system from which raw sewage is mined by pumping and piped to a treatment plant;
- the recycled water treatment plant;
- the recycled (treated) water storage tanks; and
- the recycled water distribution system.

VWST is the Licensee, holding Network Operator's Licence No. 10_008, which covers "Infrastructure used for production, treatment, filtration, storage or conveyance of non-potable water". As Licensee, VWST is responsible for the operation and maintenance of the recycled water treatment plant and associated infrastructure in accordance with its Licence Plans, including: the *Water Quality Plan (DW-WQP-001-06) Rev 6*, dated 1 May 2019 (WQP (npw)) and noting the *Water Quality Plan (DW-WQP-001-087) Rev 7*, dated 22 July 2019).

2.4 Audit method

Audit standard

The audit broadly followed the generic principles of auditing given in *ISO 19011:2011 - Guidelines for auditing management systems*. The principal document used to guide the audit was the *IPART Audit Guideline Water Industry Competition Act 2006 Guidelines* (September 2018) (WICA Audit Guideline).

Audits are by necessity limited to sampling processes. It is not practicable, nor necessary, to inspect 100 percent of items within an audit scope. Auditing forms part of the broader risk management process, providing an independent check on the veracity of the processes and procedures in place to manage risk. Finding a balance between audit effort and practicality requires the exercise of experienced professional judgement. The amount of effort allocated to this audit has been kept to a reasonable minimum level.

The audit was reported in accordance with the WICA Audit Guideline and its associated Appendices. The audit templates given in the WICA Audit Guideline provided the reporting format for the audit as well as providing the detailed audit criteria.

Audit steps

An Audit Plan was submitted to both IPART and the Licensee prior to the audit being undertaken. The Licensee supplied documentation to both the auditor and IPART prior and subsequent to the audit. The audit, which comprised of a site inspection and office based desktop audit, took place on 25 June 2019. The audit process involved seeking objective evidence that the Licensee met the audit criteria set by IPART. The auditor collected evidence through interview, document review, site inspections and review of photographs taken at the site. The auditor randomly sampled examples sufficient to verify claims made by the Licensee. Quality was assured using a professional review process; the auditor's work was reviewed and approved by another auditor.

Audit team

The auditor was Dr Dan Deere and the quality assurance of the audit report was undertaken by Mr Jim Sly.

Acknowledgements

The audit team notes, and greatly appreciates:

- the work and effort put in by those audited, including all VWST staff, particularly Subrat Kar, Inshan Sheriff and Claudio Kohn; and
- the presence of IPART representative, Gudny Palsdottir as an observer and commentator during the audit and feedback from Lil Cullen as a reviewer of the audit report drafts and for assisting with interpreting the WICA Section 16 Order in the context of an audit.

Audit grades

Audit grades have been awarded as recommended in the WICA Audit Guideline.

2.5 Regulatory regime

When auditing, relevant aspects of the following standards and regulations were considered:

- *Water Industry Competition Act 2006 (WICA).*
- *Water Industry Competition (General) Regulation 2008.*
- Network Operator's Licence No. 10_008 issued under the above framework.
- *IPART Audit Guideline Water Industry Competition Act 2006 (September 2018)* provided as part of the above framework.
- *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1), 2006.*
- Relevant NSW and National water industry and environmental codes of practice and regulations, as applicable.

2.6 Audit findings

Audit findings are summarised in section 1 (Executive Summary), in more detail in section 3, and in full detail in the Appendix.

3. Water Quality Plan – Non-Potable Water

3.1 Summary of findings

There were six identified non-material non-compliances in respect of the audited clauses of the *Water Industry Competition (General) Regulation 2008* related to the *Water Quality Plan (Non-potable Water)*. Detailed assessment in respect of these clauses is presented in **Appendix A**. In summary, the non-compliances were as follows (with detailed discussion being given in the cited tables):

- **Table A.1 WQP (npw) element one: The WQP (npw) shows a commitment to responsible use and management of recycled water quality – Non-compliant (non-material):**

The stakeholder information was broadly compliant but lacked sufficient specific details in relation to NSW Health, IPART and JLL to be compliant. VWST was able to find some of those details by the time of final reporting but hadn't fully updated the *Water Quality Plan* to include all of those details and, as such, a non-material non-compliance is reported.

To achieve full compliance, VWST should:

- **REC-DW-2019.01:**
 - VWST should update its *Water Quality Plan*, either through modifying the Plan, or adding a reference to one or more explicitly cited documents, such that it is very clear precisely:
 - who is the point of contact among key stakeholders;
 - how they are to be engaged; and
 - via what contact details.
 - The relevant NSW Health Water Unit, Public Health Unit, JLL and IPART entities should, as a minimum, be covered.
- **Table A.2 WQP (npw) element two: The WQP (npw) includes an analysis of the recycled water system – Non-compliant (non-material):**

The *Water Quality Plan* had not been fully revised to comply with the section WICA 16 Order⁹ to:

- a) fully and accurately reflect the treatment plant operating arrangements that are currently in place; and

The non-compliance was considered non-material given that in practice the relevant valves, SCADA systems, meters and pipelines had been constructed to manage the risk.

To achieve full compliance, VWST should:

- **REC-DW-2019.02:**
 - VWST should updated its *Water Quality Plan* which should be fully revised to comply with the section WICA 16 Order¹⁰ to:
 - a) fully and accurately reflect the treatment plant operating arrangements that are currently in place.
- **Table A.3 WQP (npw) element three: The WQP (npw) outlines the preventive measures for water quality management – Non-compliant (non-material):**

It's not entirely clear from the documentation if the two product water tanks are in or out of scope for VWST nor how, and to what extent, VWST should take responsibility for ongoing oversight of activities by JLL, or whether that is considered completely out of scope of the licence. Whilst this lack of clarity

⁹ IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

¹⁰ IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

wasn't considered to represent a material risk to public health, it is considered to represent a non-material non-compliance.

To achieve full compliance, VWST should:

- **REC-DW-2019.03:**
 - VWST should firmly clarify with Sydney Water, JLL and IPART the precise limits of its responsibility under its Network Operator's Licence (as well as its contract to JLL and its sewer mining agreement with Sydney Water).
 - The precise point of handover between Sydney Water, VWST and JLL should be identified from the perspective of infrastructure and, if distinct, water quality and risk management.
 - The extent of infrastructure considered to be covered under the licence should be precisely clarified with IPART as should the extent, if any, to which VWST should go beyond that infrastructure scope in relation to the oversight, management and reporting on upstream (e.g. trade waste) or downstream (e.g. plumbing and awareness controls) water quality risk management. As a minimum, unless otherwise agreed with IPART, VWST may be responsible for ensuring that water quality doesn't deteriorate in the treated water storages. Furthermore, VWST may be responsible for ensuring and providing evidence that JLL has ensured that customer's plumbing installations were compliant during construction and continues to do so as plumbing systems become modified over time.
- **Table A.6 WQP (npw) element six: The WQP (npw) includes details on the management of incidents and emergencies – Non-compliant (non-material):**

The incident information requirements were broadly compliant but lacked sufficient specific details in relation to NSW Health, IPART and JLL to be deemed fully compliant. VWST was able to find some of those details by the time of final reporting but hadn't fully updated the *Water Quality Plan* to include all of those details and, as such, a non-material non-compliance is reported.

To achieve full compliance, VWST should:

- **REC-DW-2019.04:**
 - VWST should update its *Water Quality Plan*, either through modifying the Plan, or adding a reference to one or more explicitly cited documents, such that it is very clear precisely:
 - who is to be notified;
 - via what contact details;
 - by what mechanism;
 - under what circumstances;
 - by whom from VWST; and
 - within what timeframe,in relation to clearly defined triggers relating to what constitute water quality incidents and emergencies, for the licenced infrastructure.
 - The relevant NSW Health Water Unit, Public Health Unit, customer and IPART entities should, as a minimum, be covered in the notification process or procedure.
 - The process should be robust to persons being on leave or out of contact, very clear and explicit, readily available and as unambiguous as reasonably practicable, and suitable for use during incident situations.
 - The procedure should be subjected to testing and evaluation and mechanisms should be put in place to keep it up to date.
- **Table A.9 WQP (npw) element nine: The WQP (npw) outlines the validation, research and development processes for the scheme – Non-compliant (non-material):**

The validation information is broadly compliant but lacked sufficient specific detail and currency to be compliant with modern standards of validation. VWST was able to find some of those details by the time of final reporting and was able to demonstrate that the non-compliances were not material, but it hadn't updated the *Water Quality Plan* to include sufficient information on all of those details and still had some outstanding actions to complete and, as such, a non-material non-compliance is reported.

To achieve full compliance, VWST should:

- **REC-DW-2019.05:**
 - VWST should update its *Water Quality Plan*, either through modifying the Plan, or adding a reference to one or more explicitly cited documents, such that it is very clear precisely which documents, and versions of those documents, are relied upon to provide validation.
 - In relation to the membrane, the explicit citations need to be added although the evidence available to VWST appears sufficient.
 - In relation to the UV disinfection system the evidence appears sufficient but:
 - the specific lower limiting UVT needs to be documented and cited; and
 - a detailed explanation of why online UVT monitoring is not required should be added to justify not having a UVT measurement online to ensure that the UV disinfection system is operating within its validated UVT range.
 - In relation to the chlorine dosing system, a reasonable basis should be given to explain the adequacy of the chlorine dose, given the temperature, pH, turbidity, contact time and chlorine concentration dynamic range of operation and the target pathogen under consideration.
- **Table A.10 WQP (npw) element ten: The WQP (npw) outlines the process for management of documentation and records as well as the reporting requirement – Non-compliant (non-material):**

The *Water Quality Plan*, including the process flow diagram and SCADA screens, have yet to be fully revised to comply with the WICA section 16 Order¹¹ to:

- b) include measures to ensure that historical flow data for treated water discharged from the treatment plant, or similar alternative information, is retained as evidence to demonstrate that out-of-specification water has not been delivered into supply, in particular, flow monitoring downstream of the diversion of out-of-specification water back to the treatment train or records of the open or close status of valves at the diversion point.

The non-compliance was considered non-material given that in practice records from the SCADA system were shown to prove that it was working.

To achieve full compliance, VWST should:

- **REC-DW-2019.06:**
 - VWST should update its *Water Quality Plan* which should be fully revised to comply with the WICA section 16 Order¹² to:
 - b) include measures to ensure that historical flow data for treated water discharged from the treatment plant, or similar alternative information, is retained as evidence to demonstrate that out-of-specification water has not been delivered into supply, in particular, flow monitoring downstream of the diversion of out-of-specification water back to the treatment train or records of the open or close status of valves at the diversion point.

¹¹ IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

¹² IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

3.2 Addressing audit requirements under the Order and NSW Health feedback

This section of the audit report cross-references the “*Discussion and notes*” rows of the appended detailed audit tables (Appendix 1) in which the specific WICA section 16 Order¹³ and NSW Health feedback requirements were addressed within the body of the audit report. The cross references to the relevant audit tables are given [*in italics in square parentheses*].

The Order¹⁴ required the auditor to assess whether the WQP (npw), including the process flow diagram, was revised to:

- (a) fully and accurately reflect the treatment plant operating arrangements that are currently in place; [*discussed in Table A.2*] and
- (b) include measures to ensure that historical flow data for treated water discharged from the treatment plant, or similar alternative information, is retained as evidence to demonstrate that out-of-specification water has not been delivered into supply, in particular, flow monitoring downstream of the diversion of out-of-specification water back to the treatment train or records of the open or close status of valves at the diversion point [*discussed in Table A.10*].

NSW Health provided feedback to VWST in an email dated 31 May 2019 that set out the following requests:

- Review role and name of NSW Health. This is inconsistent between section 9 and section 11.1.2 [*discussed in Table A.1*].
- Review section on incidents. Section 11.6 does not detail potential incidents (for example would exceeding a critical limit be captured?). Also it does not include contact details of relevant agencies to be notified in an incident [*discussed in Table A.6*]. The Appendix 2 contact list does not include the PHU [*discussed in Table A.1*].
- Review the PFD. It doesn't easily identify CCPs. Have any bypasses been captured [*discussed in Table A.2*]?
- The risk assessment in section 11.2.4 could be reviewed. It is unclear if that is the complete risk assessment [*discussed in Table A.2*].
- Review CCPs and confirm they are operational and appropriate:
 - Section 11.2.4 mentions UV reactor monitoring and response to UVT. This is not in the CCP table in section 11.5.1 [*discussed in Table A.3*].
 - The CCP table in 11.5.1 shows potential critical limits, are these in place [*discussed in Table A.3*]?
- In 11.5.1 the free chlorine in the treated water is listed as 0.2-2 mg/L as the range for 'potential critical limits'. What is the C.t. achieved with 0.2 mg/L? The plan claims 4 LRV for bacteria and virus [*discussed in Table A.9*].

The findings in respect of these items are integrated with the main body of the report where indicated in the cited tables and a summary of the findings is captured in section 3.1.

3.3 Review of actions

Following the field audit on 25 June 2019, and the issue of a draft 'version 1' audit report on 25 June 2019, significant additional evidence was provided by VWST. This evidence included:

- information relating to contact details for NSW Health (discussed under Table A.1);
- incident response protocols (discussed under Table A.6); and
- validation (discussed under Table A.9).

The result was that two potentially material non-compliances relating to incident response (discussed under Table A.6) and process validation (discussed under Table A.9) were reduced to non-material non-compliances and a non-material non-compliance relating to stakeholder identification (discussed under Table A.1) was made less significant and partially addressed, albeit still being a non-material non-compliance.

¹³ IPART, “Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000”, dated 10 April 2019, IPART reference D19/8808.

¹⁴ IPART, “Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000”, dated 10 April 2019, IPART reference D19/8808.

Following submission of the second draft 'version 2' audit report on 28 June 2019 to IPART, more explicit detail was requested from IPART in relation to precisely how the auditor had assessed the audit requirements under the WICA section 16 Order¹⁵ and NSW Health feedback. In updating the audit report additional and explicit detail was provided to address those requirements. A number of typographical and consistency errors were identified by IPART during its review and these were also addressed.

Following quality review of the third draft 'version 3' of the audit report issued on 8 July 2019 to Jim Sly a number of significant technical changes were made along with improved clarity, consistency and precision of reporting.

Following IPART's review of the fourth draft 'version 4' of the audit report, two opportunities for improvement were converted to non-material non-compliances with recommendations. These changes were made in response to IPART's response to those requirements as they related to the WICA section 16 Order¹⁶ which was interpreted more literally than had been the case during the previous audit report drafts. This 'version 5' of the audit report includes those additional non-compliances.

VWST issued a further revised *Water Quality Plan*¹⁷ on 22 July 2019 which has gone some way to addressing some of the non-compliances and opportunities for improvement, but has yet to address them all. Furthermore, changes made more than 28 days after the date of the WICA section 16 Order¹⁸ are beyond the required timeframe set under that WICA section 16 Order¹⁹, hence any revisions to the *Water Quality Plan* made now, or at any time since 8 May 2019, will not lead to a compliant finding against that Order²⁰ in this or a future revision to this audit report.

3.4 Opportunities for improvement

Two opportunities for improvement have been identified in respect of the *Water Quality Plan (non-potable water)* as a result of this audit, as follows:

- **OFI-DW-2019.01:** VWST should consider updating its *Water Quality Plan* to more directly and explicitly cite the recycled water quality risk assessment documents.
- **OFI-DW-2019.02:** VWST should review the level and types of resource committed to the management, administration and compliance requirements of the scheme, beyond the technical and contractual, and makes appropriate adjustments. JLL may need to be involved in these adjustment since they may need to be reflected in a future revision to the contract.

¹⁵ IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

¹⁶ IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

¹⁷ VWST, *Water Quality Plan* (DW-WQP-001-07) Rev 7, dated 22 July 2019.

¹⁸ IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

¹⁹ IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

²⁰ IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

Appendix A Detailed Audit Findings – Water Quality Plan (non-potable water) (WQP (npw))

Table A.1 WQP (npw) element one

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.7(1)(b)	Element one The WQP (npw) shows a commitment to responsible use and management of recycled water quality.	Non-compliant (non-material)
Risk	Target for Full Compliance	
The lack of a water quality policy, up to date and accurate details for regulatory and formal requirements and contact details for stakeholders presents a small operational risk for this scheme.	A water quality policy, an up to date list of regulatory and formal requirements and an up to date list of stakeholders and their contact details.	
Evidence sighted		
<ul style="list-style-type: none"> ▪ Interviews with VWST personnel on 25 June 2019. ▪ Site inspections of infrastructure on 25 June 2019. ▪ VWST, Water Quality Plan (DW-WQP-001-06) Rev 6, dated 1 May 2019. ▪ Email entitled “Re: Working draft report” from Subrat Kar of VWST to Dan Deere at 10:29 on 26 June 2019. 		
Summary of reasons for grade		
<p>VWST demonstrated that it has measures in place for ensuring the responsible use of recycled water, an up-to-date list of regulatory and formal requirements, an up-to-date list of stakeholders and their contact details, and a <i>Recycled Water Policy</i>. It also demonstrated that it had engaged its principal stakeholders (NSW Health and IPART) in conducting a risk assessment workshop.</p> <p>The stakeholder information was broadly compliant but lacked sufficient specific details in relation to NSW Health, IPART and JLL to be compliant. VWST was able to find some of those details by the time of final reporting but hadn’t updated the <i>Water Quality Plan</i> to include those details and, as such, a non-material non-compliance is reported.</p>		
Discussion and notes		
Overview:		
VWST’s commitment to recycled water quality management is outlined in the <i>Water Quality Plan</i> , ²¹ Specific arrangements are discussed in the following.		
Responsible use of recycled water:		
The <i>Water Quality Plan</i> ²² outlines arrangements for ensuring the responsible use of recycled water and the involvement of stakeholders.		
Regulatory and formal requirements:		
There is a list of regulatory and formal requirements within the <i>Water Quality Plan</i> . ²³ The lists are not exhaustive, but cover the main requirements relevant to recycled water quality management. The identification of, and compliance with, regulatory and formal requirements is systematically managed		

²¹ *Water Quality Plan*, section 11.1.

²² *Water Quality Plan*, section 11.1.1 and section 9.

²³ *Water Quality Plan*, Section 11.1.2.

through the Corporate WSHEQ Compliance Manager's role and is covered under certified ISO management systems.

It was noted at the time of the audit that the five year Operations & Maintenance (including supply) Contract between VWS and JLL was not to be extended beyond 30th July 2019. VWST advised that they received an extension beyond 30th July 2019 until end July 2020 during the week following the audit and showed evidence of this. For a project such as this, it would be more usual for JLL to form a long-term contract with VWST in order to support longer-term and more efficient management to better protect water quality.

Partnerships and engagement of stakeholders:

The *Water Quality Plan*²⁴ identifies stakeholders that have an interest in management of the recycled water scheme and introduces the 'Building Manager' (BM, JLL in this case) as one such responsible entity. The plan, however, does not contain contact details for stakeholders or summaries of the key engagement mechanisms of the key stakeholders. These engagement mechanisms are proposed for future development, albeit the scheme has been running since 2011. In practice, whilst not developed, for a scheme of this scale and nature the level of detail is almost sufficient bar the omission of adequate information on the NSW Health contacts. Specifically, the details relating to NSW Health are too brief. There is incorrect nomenclature for the agency, NSW Health, and a lack of separation into the Water Unit and Public Health Unit, and their contact details and roles in routine and emergency management and response. VWST wasn't aware of the Public Health Unit or of who the contact person in the Public Health Unit was.

Following the audit VWST followed up with the NSW Health Water Unit and was able to identify that the relevant NSW Health Public Health Unit contact was Ms. Toni Cains, Senior Environment and Health Officer of the South East Sydney Local Health District on 9382 8242.²⁵ However, the *Water Quality Plan* was not updated by the time of writing of this report. Therefore, the *Water Quality Plan* was found not to be compliant in that it wasn't clear or explicit that there was a Public Health Unit separate from the Water Unit, now how those parties would be contacted. The non-compliance was found to be non-material by the time of completing the audit report given that by that time VWST had provided evidence that it had become familiar with the process. But the absence of formalisation of that process resulted in a non-material non-compliance being recorded.

Recycled water policy:

VWST has a *Water Quality Policy*²⁶ in place. The policy appropriately addresses the guideline requirements. The extent to which the *Policy* has been communicated has not been assessed in detail; however, it is noted that:

- As VWST is relatively small, the number of personnel directly engaged in recycled water quality management is minimal; consequently, communication of policy isn't a major issue as it can be in larger companies.
- Based on discussions with relevant VWST personnel during this and previous audits, it is clear that they are aware of the policy and the associated obligations.

Response to feedback from NSW Health:

Feedback from NSW Health provided to VWST in an email dated 31 May 2019 set out, among other things, the following requests relevant to this component of the audit:

"Review role and name of NSW Health. This is inconsistent between section 9 and section 11.1.2. The Appendix 2 contact list does not include the PHU."

This is discussed in the *Partnerships and engagement of stakeholders* subsection of this table which explains that there are inadequacies in relation to how the role, name and contact details for NSW Health are set out in the *Water Quality Plan*. VWST contacted NSW Health after the field audit and was able to source sufficient evidence that a non-compliant finding was reduced to being (non-material), but the *Water Quality Plan* was not updated leading to recommendation (**REC-DW-2019-01**) which requires action in response to NSW Health's feedback as well as similar issues identified for other stakeholders.

²⁴ *Water Quality Plan*, sections 11.1.3, 6, 9 and Appendix 6.

²⁵ Email entitled "Re: Working draft report" from Subrat Kar of VWST to Dan Deere at 10:29 on 26 June 2019.

²⁶ *Water Quality Plan*, section 11.1.4 and noting the Veolia Water Technology, *Policy Water Quality*, February 2018 (<http://www.veoliawatertechnologies.com.au/vwst-australia/ressources/files/1/28413-Policy-Water-Quality-2.1.pdf>).

Recommendations

REC-DW-2019.01: It is recommended that VWST updates its *Water Quality Plan*, either through modifying the Plan, or adding a reference to one or more explicitly cited documents, such that it is very clear precisely who is the point of contact among key stakeholders, how they are to be engaged and via what contact details. The relevant NSW Health Water Unit, Public Health Unit, JLL and IPART entities should, as a minimum, be covered.

Opportunities for improvement

No opportunities for improvement have been identified in respect of this obligation.

Table A.2 WQP (npw) element two

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.7(1)(b)	Element two The WQP (npw) includes an analysis of the recycled water system.	Non-compliant (non-material)
Risk		Target for Full Compliance
Failure to adequately describe the system and assess risks could lead to risks being overlooked.		Adequate system description and risk assessment.
Evidence sighted		
<ul style="list-style-type: none"> ▪ Interviews with VWST personnel on 25 June 2019. ▪ Site inspections of infrastructure on 25 June 2019. ▪ VWST, Water Quality Plan (DW-WQP-001-06) Rev 6, dated 1 May 2019. 		

Summary of reasons for grade

VWST demonstrated that the *Water Quality Plan* and other referenced documentation, includes an assessment of the recycled water supply system. The system arrangement is clearly documented and a risk assessment has been undertaken by an appropriately experienced team in accordance with the guidance presented in the *Australian Guidelines for Water Recycling* (AGWR).

At the time of the audit, the *Water Quality Plan*, including the process flow diagram, had not been fully revised to comply with the WICA section 16 Order²⁷ to:

- a) fully and accurately reflect the treatment plant operating arrangements that are currently in place.

As such, a non-material non-compliance is reported. The non-compliance was considered non-material given that in practice the relevant valves, SCADA systems, meters and pipelines had been constructed to manage the risk.

Discussion and notes

Overview:

An assessment of the recycled water supply system is outlined in the *Water Quality Plan*.²⁸ Specific arrangements are discussed in the following.

Source of recycled water, intended uses, receiving environments and routs of exposure:

The *Water Quality Plan*²⁹ indicates that the source water will comprise sewage collected from the local sewer, which services both residential and commercial/retail premises, under a sewer mining agreement.

The *Water Quality Plan*³⁰ identifies the intended uses of recycled water as: cooling tower; toilet flushing; garden irrigation. These uses are consistent with those permitted by the Licence.³¹

The *Water Quality Plan*³² indicates that people can be exposed to recycled water and that these risks were considered in the risk assessment.

Recycled water systems analysis:

²⁷ IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

²⁸ *Water Quality Plan*, section 11.2.

²⁹ *Water Quality Plan*, section 11.2.1.

³⁰ *Water Quality Plan*, section 11.2.1.

³¹ WICA Network Operator's Licence No: 10_008, table 3.

³² *Water Quality Plan*, section 11.6.1.

The Darling Quarter recycled water scheme overall is adequately described in the *Water Quality Plan*.³³ The main process flow diagram doesn't have CCPs indicated, nor are monitoring points or alternative flow pathways shown. Auditing of the site revealed that bypasses and alternative flow pathways weren't in place in practice and so showing them on the flow diagram wasn't necessary. In addition, a separate concise flow diagram has recently been set up to reveal the CCPs.³⁴ However, at the time of the audit, the process flow diagrams and SCADA showed neither the flow path(s) for the return of out-of-spec water nor the additional valves and flow meter that have been installed. Therefore, it was concluded that the *Water Quality Plan* had not been fully revised to comply with the WICA section 16 Order³⁵ to:

- a) fully and accurately reflect the treatment plant operating arrangements that are currently in place.

As such, a non-compliance is reported. The non-compliance was considered non-material given that in practice the relevant valves, SCADA systems, meters and pipelines had been constructed to manage the risk and a recommendation (**REC-DW-2019.02**) is made to address the non-compliance.

Assessment of water quality data:

As noted above, source water for the recycled water system comprises mainly sewage from residential, commercial and retail connections. VWST has designed the treatment system around its original sewer mining data and continues to monitor water quality which is reasonably typical of municipal sewage.³⁶

Hazard identification and risk assessment:

The approach used by VWST for its hazard identification and risk assessment is summarised in the *Water Quality Plan*³⁷ which in turn refers out to the *Retail Supply Management Plan* for the details of the risk assessments. The risk assessments provided by VWST, which include a high level risk assessment for the scheme completed under the HAZOP on 22 March 2010 and a HACCP-style risk assessment completed on 25 July 2011, collectively provide sufficient risk assessment documentation to meet this requirement. The risk assessment for the scheme was most recently updated on 13 June 2019.

In summary, review of the *Darling Quarter Scheme Risk? Register* leads to the assessment that the hazard identification and risk assessment process has appropriately addressed the Darling Quarter recycled water system.

Response to feedback from NSW Health:

Feedback from NSW Health provided to VWST in an email dated 31 May 2019 set out, among other things, the following requests relevant to this component of the audit:

“Review the PFD. It doesn't easily identify CCPs. Have any bypasses been captured?”

This is discussed in the *Recycled water systems analysis* subsection of this table which explains that a separate dedicated diagram has been added to the *Water Quality Plan* to show CCPs and noting that bypasses were not present and hence did not need to be captured in this case. Whilst not the ideal way to present the information, VWST was assessed as having complied with respect to this feedback. An opportunity for improvement (**OFI-DW-2019.01**) was noted in relation to VWST considering updating its *Process Block Flow Diagram* and/or its *Control Critical Points & Sample Points Diagram* to more explicitly show the point at which critical limits are monitored and flow paths for out-of-specification water and the additional valves and flow meter that have been installed.

The feedback from NSW Health also set out the following requests relevant to this component of the audit:

“The risk assessment in section 11.2.4 could be reviewed. It is unclear if that is the complete risk assessment.”

This is discussed in the *Hazard identification and risk assessment* subsection of this table which explains that separate risk assessments were completed. The *Water Quality Plan* refers to the *Retail Supply Management Plan* for the details of the risk assessments. Whilst not the ideal way to present the information, particularly lack of a direct citation from the *Water Quality Plan* to the risk assessments but rather a reference via the

³³ *Water Quality Plan*, section 11.2.2.

³⁴ *Water Quality Plan, Control Critical Points & Sample Points Diagram*, page number 33 (PDF page 35).

³⁵ IPART, “Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000”, dated 10 April 2019, IPART reference D19/8808.

³⁶ *Water Quality Plan*, section 11.2.3.

³⁷ *Water Quality Plan*, section 11.2.4.

Retail Supply Management Plan, VWST was assessed as having complied with respect to this feedback. An opportunity for improvement (**OFI-DW-2019.01**) was noted in relation to more directly and explicitly citing the recycled water quality risk assessment documents in the *Water Quality Plan*.

Response to the Order under WICA section 16:

As noted above in this audit table, under “*Recycled water systems analysis*”, it was concluded that the *Water Quality Plan* had not been fully revised to comply with the WICA section 16 Order³⁸ to:

- a) fully and accurately reflect the treatment plant operating arrangements that are currently in place.

As noted above, a non-compliance is reported and a recommendation (**REC-DW-2019.02**) made.

Recommendations

REC-DW-2019.02: VWST should updated its *Water Quality Plan* which should be fully revised to comply with the WICA section 16 Order³⁹ to:

- a) fully and accurately reflect the treatment plant operating arrangements that are currently in place.
-

Opportunities for improvement

OFI-DW-2019.01: VWST should consider updating its *Water Quality Plan* to more directly and explicitly cite the recycled water quality risk assessment documents.

³⁸ IPART, “Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000”, dated 10 April 2019, IPART reference D19/8808.

³⁹ IPART, “Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000”, dated 10 April 2019, IPART reference D19/8808.

Table A.3 WQP (npw) element three

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.7(1)(b)	Element three The WQP (npw) outlines the preventive measures for water quality management.	Non-compliant (non-material)
Risk Failure to adequately define preventive measures and assess residual risks could lead to risks being overlooked.		Target for Full Compliance Adequate definition of preventive measures and residual risk assessment.
Evidence sighted		
<ul style="list-style-type: none"> ▪ Interviews with VWST personnel on 25 June 2019. ▪ Site inspections of infrastructure on 25 June 2019. ▪ VWST, Water Quality Plan (DW-WQP-001-06) Rev 6, dated 1 May 2019. 		
Summary of reasons for grade		
<p>VWST has provided details in relation to the risk management measures (controls) that it has implemented in respect of recycled water quality. It has also identified the critical control points (CCPs) that are used to monitor performance of the multiple barrier treatment process to achieve the pathogen log reduction values required to ensure that the water is compliant with the requirements of the AGWR.</p>		
<p>It's not entirely clear from the documentation if the two product water tanks are in or out of scope for VWST nor how, and to what extent, VWST should take responsibility for ongoing oversight of activities by JLL, or whether that is considered completely out of scope of the licence. Whilst this lack of clarity wasn't considered to represent a material risk to public health, it is considered to represent a non-material non-compliance.</p>		
Discussion and notes		
Overview:		
<p>Details of preventive measures and critical control points adopted in respect of the recycled water supply system are outlined in the <i>Water Quality Plan</i>.⁴⁰ Specific arrangements are discussed in the following.</p>		
Preventive measures and multiple barriers:		
<p>Preventive measures have been identified from the source (relating to trade waste) through water treatment and storage. The <i>Water Quality Plan</i> further indicates that the recycled water treatment plant incorporates multiple barriers in accordance with industry best practice for the production of recycled water. The target log reduction values for pathogens from the treatment train are identified in line with those required under the AGWR. An air gap was seen in both final water tanks to protect the potable water supply from backflow, as was a certified compliant backflow prevention device (Figure 1). In the toilets at the site the recycled water signage was clear (Figure 2).</p>		
<p>Based on the <i>Water Quality Plan</i> it was clear that plumbing and use of the water was out of scope for VWST and was considered out of scope for this audit. Appendix C of an attachment to the Contract and Professional Services Agreement executed in 2012 between VWST and JLL identifies the Building Manager (JLL or their appointee in this case) as being responsible beyond the termination points within the recycled water treatment plant. Therefore, the plumbing was considered out of scope of this audit and the licence. However, the precise points of handover and areas of responsibility were not explicit or clear.</p>		
<p>It would be useful to provide more certainty with respect to precisely where responsibility ends in respect of both the licence, the sewer mining agreement with Sydney Water and the contract with JLL. For instance,</p>		

⁴⁰ *Water Quality Plan*, section 11.3.

the extent to which VWST should provide feedback to Sydney Water on trade management wasn't clear. In addition, it's not clear from the documentation if the two product water tanks are in or out of scope for VWST although it is understood that to date they have been considered out of scope. This is relevant both to management of the scheme and achievement of disinfection and the stability of water in the product water tanks and distribution system as well as plumbing system controls. Furthermore, it wasn't clear how, and to what extent, VWST should take responsibility for ongoing oversight of activities by JLL, or whether that is considered completely out of scope of the licence. Whilst this lack of clarity wasn't considered to represent a material risk to public health, it was considered to represent a non-material non-compliance and a recommendation (**REC-DW-2019.03**) for its rectification are made.

Critical control points:

The critical control points (CCPs) have been identified along with critical limits and process controls for the CCPs and these are appropriate. Further details of the CCPs, their monitoring and the associated pathogen log reduction values are documented in the Verification section of the *Water Quality Plan*.⁴¹

Response to feedback from NSW Health:

Feedback from NSW Health provided to VWST in an email dated 31 May 2019 set out, among other things, the following request relevant to this component of the audit:

“Review CCPs and confirm they are operational and appropriate:

- Section 11.2.4 mentions UV reactor monitoring and response to UVT. This is not in the CCP table in section 11.5.1.

This is discussed in the *Validation of processes* subsection of Table A.9 under the third bullet point and was found to be non-compliant (non-material). A recommendation (**REC-DW-2019.04**) is made (in Table A.9) that covers this among other non-compliant items.

In addition, the feedback from NSW Health also set the following request relevant to this component of the audit:

“Review CCPs and confirm they are operational and appropriate:

- The CCP table in 11.5.1 shows potential critical limits, are these in place?”

This is discussed in the *Critical control points* subsection this table and the CCPs were found to be appropriate.

Recommendations

REC-DW-2019.03: It is recommended that VWST firmly clarifies with Sydney Water, JLL and IPART the precise limits of its responsibility under its Network Operator's Licence (as well as its contract to JLL and its sewer mining agreement with Sydney Water). The precise point of handover between Sydney Water, VWST and JLL should be identified from the perspective of infrastructure and, if distinct, water quality and risk management. The extent of infrastructure considered to be covered under the licence should be precisely clarified with IPART as should the extent, if any, to which VWST should go beyond that infrastructure scope in relation to the oversight, management and reporting on upstream (e.g. trade waste) or downstream (e.g. plumbing and awareness controls) water quality risk management. As a minimum, unless otherwise agreed with IPART, VWST may be responsible for ensuring that water quality doesn't deteriorate in the treated water storages. Furthermore, VWST may be responsible for ensuring and providing evidence that JLL has ensured that customer's plumbing installations were compliant during construction and continues to do so as plumbing systems become modified over time.

Opportunities for improvement

No opportunities for improvement have been identified in respect of this obligation.

⁴¹ *Water Quality Plan*, section 11.5.1 and 11.5.3.

Table A.4 WQP (npw) element four

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.7(1)(b)	Element four The WQP (npw) outlines the operational procedures and process control for the scheme.	Compliant
Risk	Target for Full Compliance	
Failure to adequately formalise procedures could lead to inconsistent operation and exposes customers to risk of poor quality water being supplied.	Adequate detail on operational procedures to protect water quality.	
Evidence sighted		
<ul style="list-style-type: none">▪ Interviews with VWST personnel on 25 June 2019.▪ Site inspections of infrastructure on 25 June 2019.▪ VWST, Water Quality Plan (DW-WQP-001-06) Rev 6, dated 1 May 2019.		
Summary of reasons for grade		
VWST has outlined its arrangements in relation to operational procedures, operational monitoring and process control in the <i>Water Quality Plan</i> . The system in place is highly automated and relies largely on automated procedures for process control. Accordingly, VWST is assessed to have demonstrated compliance with this obligation.		
Discussion and notes		
Overview: The arrangements in respect of operational procedures and process control of the recycled water supply system are outlined in the <i>Water Quality Plan</i> . ⁴² Specific arrangements are discussed in the following.		
Operational procedures: The <i>Water Quality Plan</i> ⁴³ indicates that the <i>Infrastructure Operating Plan</i> (IOP) contains reference to the schemes detailed O&M Manual and servicing requirements including a Maintenance Checklist. The O&M Manual in fact consists of a large package of vendor-supplied and other operational documents. Hard copies are kept on site at the treatment plant. In addition, these documents are sitting in a directory for the scheme covering sensors, valves and treatment processes. The Maintenance Checklist was part of the “Darling Quarter RWP Operation Diary & Monitoring new1 20170729” worksheet. The worksheet included a diary tab to schedule and record activities, a maintenance checklist tab to cover maintenance tasks, and a CCP record tab to capture records of CCP monitoring activities. Calendar reminders were also sighted.		
Operational monitoring: The <i>Water Quality Plan</i> ⁴⁴ indicates that operational monitoring will occur based around a SCADA system which is in turn focused on CCPs. The details of that monitoring are documented in the Verification section of the <i>Water Quality Plan</i> . ⁴⁵		

⁴² *Water Quality Plan*, section 11.4.

⁴³ *Water Quality Plan*, section 11.4.1.

⁴⁴ *Water Quality Plan*, section 11.4.2.

⁴⁵ *Water Quality Plan*, section 11.5.1.

Operational corrections:

The *Water Quality Plan*⁴⁶ summarises corrections. In general, non-compliance with critical limits at CCPs will result in plant shutdown and cessation of recycled water production with this process being automatically controlled by the treatment plant PLC. The system relies on valves and flow meters to divert non-compliant water via SCADA. A range of specific responses to specific items is summarised in the *Water Quality Plan*.⁴⁷ A more detailed discussion about the specific operational correction of including measures to ensure that records are maintained to demonstrate that operational corrections have been implemented where required is given in Table A.10.

Equipment capability and maintenance:

The *Water Quality Plan*⁴⁸ notes that equipment and devices were selected and are operated with reliability in mind and refers to the O&M Manual and a Maintenance Checklist for details.

Materials and chemicals:

The *Water Quality Plan*⁴⁹ refers to relevant guidance documents for material standards that are appropriate as well as referencing suitably procured chemicals. This guidance is considered appropriate.

Recommendations

There are no recommendations in respect of this obligation.

Opportunities for improvement

No opportunities for improvement have been identified in respect of this obligation.

⁴⁶ *Water Quality Plan*, section 11.4.3.

⁴⁷ *Water Quality Plan*, section 11.4.3.

⁴⁸ *Water Quality Plan*, section 11.4.4.

⁴⁹ *Water Quality Plan*, section 11.5.1.

Table A.5 WQP (npw) element five

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.7(1)(b)	Element five The WQP (npw) outlines the process for verification of the water quality.	Compliant

Risk	Target for Full Compliance
Inadequate verification presents a risk of ongoing supply of unfit recycled water over the longer term.	A suitable verification program is required to ensure that ongoing monitoring and assurance takes place.

Evidence sighted

- Interviews with VWST personnel on 25 June 2019.
- Site inspections of infrastructure on 25 June 2019.
- VWST, Water Quality Plan (DW-WQP-001-06) Rev 6, dated 1 May 2019.

Summary of reasons for grade

VWST has appropriately detailed its recycled water quality verification processes. These processes involve the monitoring of water quality data and customer complaints; appropriate corrective actions have also been identified.

Accordingly, VWST is assessed to have demonstrated compliance with this obligation.

Discussion and notes

Overview:

The process for verification of recycled water quality is outlined in the *Water Quality Plan*.⁵⁰ Specific arrangements are discussed in the following.

Recycled water quality monitoring:

Arrangements in respect of verification monitoring of recycled water quality are detailed in the *Water Quality Plan*.⁵¹ This outlines an appropriately verification monitoring program using NATA accredited facilities.

Application site and receiving environment monitoring:

In this context there are no specific obligations in relation to application site and receiving environment monitoring other than plumbing controls that are managed by JLL as noted in the *Water Quality Plan*.⁵²

Documentation and reliability:

The *Water Quality Plan*⁵³ refers to the use of suitably NATA accredited procedures for monitoring to assure its quality, including documentation and reliability.

Satisfaction of users of recycled water:

The *Water Quality Plan*⁵⁴ refers to the JLL entity in relation to assessing the satisfaction of users and VWST's responsibility ends at the delivery point from the recycled water treatment plant.

Short-term evaluation of results:

⁵⁰ *Water Quality Plan*, section 11.5.
⁵¹ *Water Quality Plan*, section 11.5.1.
⁵² *Water Quality Plan*, section 11.5.2.
⁵³ *Water Quality Plan*, section 11.5.1.
⁵⁴ *Water Quality Plan*, section 11.5.4.

The *Water Quality Plan*⁵⁵ refers to short-term evaluation of results but does not provide details of those processes at this point in the document. However, other sections of the document, including those relating to operational monitoring and incident response in particular, do provide sufficient detail. The relevant information on verification evaluation has been integrated with the information on monitoring given under sections covering operational monitoring and incident response.

Corrective responses:

The *Water Quality Plan*⁵⁶ summarises corrective responses but does not provide full details of the processes under that heading. However, other sections of the *Water Quality Plan*⁵⁷, including those relating to operational monitoring and incident response in particular, do provide sufficient detail on specific responses to specific items. The relevant information on verification response has been integrated with the information on monitoring given under sections covering verification monitoring and incident response.

Recommendations

There are no recommendations in respect of this obligation.

Opportunities for improvement

No opportunities for improvement have been identified in respect of this obligation.

⁵⁵ *Water Quality Plan*, section 11.5.5.

⁵⁶ *Water Quality Plan*, section 11.5.6.

⁵⁷ *Water Quality Plan*, section 11.4.3.

Table A.6 WQP (npw) element six

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.7(1)(b)	Element six The WQP (npw) includes details on the management of incidents and emergencies.	Non-compliant (non-material)
Risk	Target for Full Compliance	
The absence of an approach for handling incidents and emergencies presents a risk of poor response to incidents arising related to the recycled water supply scheme.	An adequate management plan for incidents and emergencies.	
Evidence sighted		
<ul style="list-style-type: none"> ▪ Interviews with VWST personnel on 25 June 2019. ▪ Site inspections of infrastructure on 25 June 2019. ▪ VWST, Water Quality Plan (DW-WQP-001-06) Rev 6, dated 1 May 2019. ▪ Email entitled “Re: Working draft report” from Subrat Kar of VWST to Dan Deere at 10:29 on 26 June 2019. 		
Summary of reasons for grade		
VWST has developed an approach to the management of incidents and emergencies, which is documented in the <i>Water Quality Plan</i> .		
The incident information requirements were broadly compliant but lacked sufficient specific details in relation to NSW Health, IPART and JLL to be deemed fully compliant. VWST was able to find some of those details by the time of the report but hadn’t updated the <i>Water Quality Plan</i> to include those details and, as such, a non-material non-compliance is reported.		
Discussion and notes		
Overview:		
Details of the arrangements for the management of incidents and emergencies are outlined in the <i>Water Quality Plan</i> . ⁵⁸ The generic response to incidents and emergencies is discussed although those related to recycled water are not covered in detail. The focus of what is documented is very broad.		
Communication:		
VWST list agency contact details in its <i>Water Quality Plan</i> . ⁵⁹ As noted under Table A.1, the details relating to NSW Health need updating and are very general in nature.		
Incident and emergency response protocols:		
Protocols in place in relation to incident and emergency response are summarised in the <i>Water Quality Plan</i> . ⁶⁰ Those related to recycled water are not covered in detail but “Loss of PLC/SCADA system”, “UV / chlorination failure” and “Water specifications not met” are highlighted as incident triggers under section 11.6 of the document. Section 11.6 then refers to Appendices 1 and 2 that elevate action. In turn, under Section 7 of Appendix 1 of the document the Compliance Manager (Filbert Hidayat) is required to manage the response in liaison with the relevant Contract Manager (Subrat Kar) or General Council (Martin Reid) and adopt the appropriate response. Therefore, there is a pathway from a number of recycled water quality incidents to Subrat Kar and/or Martin Reid. However, that is where the formalised process ends. The specific notification and reporting process, along with the contact personnel within IPART, NSW		

⁵⁸ *Water Quality Plan*, section 11.6 and Appendices 1 and 2.

⁵⁹ *Water Quality Plan*, section 11.6.1 and Appendix 2.

⁶⁰ *Water Quality Plan*, section 11.6.2 and Appendix 1.

Health and the customer, were not clear, nor were formal notification triggers, reporting timeframes or mechanisms.

VWST was asked to explain its notification and follow-up process during the site audit. VWST staff were aware that there was an IPART incident notification form, and noted that the form mentioned NSW Health. However, VWST didn't have the relevant forms noted or cited in any documentation to formalise and ensure their use in practice. What documentation as there was noted the need to liaise with NSW Health and notify the incident as appropriate, including to NSW Health, but did not identify the relevant NSW Health contact persons or their contact details and there wasn't an awareness within VWST as to what those notification requirements were. Specifically VWST wasn't aware of the need to notify the Public Health Unit or of who the contact person in the Public Health Unit was.

Following the audit VWST followed up with the NSW Health Water Unit and was able to identify that the relevant NSW Health Public Health Unit contact was Ms. Toni Cains, Senior Environment and Health Officer of the South East Sydney Local Health District on 9382 8242.⁶¹ However, the *Water Quality Plan* was not updated nor was any formalisation implemented by the time of writing of this report. Therefore, the *Water Quality Plan* was found not be compliant in that it wasn't clear or explicit what would lead to notifications, to whom, from whom, by what mechanisms or under what process or timeframe. The non-compliance was found to be non-material by the time of completing the audit report given that by that time VWST had provided evidence that it had become familiar with the process. But the absence of formalisation of that process resulted in a non-material non-compliance being recorded. A recommendation (**REC-DW-2019.04**) to remedy the non-compliance is made.

Response to feedback from NSW Health:

Feedback from NSW Health provided to VWST in an email dated 31 May 2019 that set out, among other things, the following request relevant to this component of the audit:

“Review section on incidents. Section 11.6 does not detail potential incidents (for example would exceeding a critical limit be captured?). Also it does not include contact details of relevant agencies to be notified in an incident.” The Appendix 2 contact list does not include the PHU.”

This is discussed in the *Incident and emergency response protocols* subsection of this table and was found to be non-compliant (non-material); as noted above, a recommendation (**REC-DW-2019.04**) that covers this among other non-compliant items is made.

Recommendations

REC-DW-2019.04: It is recommended that VWST update its *Water Quality Plan*, either through modifying the Plan, or adding a reference to one or more explicitly cited documents, such that it is very clear precisely who is to be notified, via what contact details, by what mechanism, under what circumstances, by whom from VWST, and within what timeframe, in relation to clearly defined triggers relating to what constitute water quality incidents and emergencies, for the licenced infrastructure. The relevant NSW Health Water Unit, Public Health Unit, customer and IPART entities should, as a minimum, be covered in the notification process or procedure. The process should be robust to persons being on leave or out of contact, very clear and explicit, readily available and as unambiguous as reasonably practicable, and suitable for use during incident situations. The procedure should be subjected to testing and evaluation and mechanisms should be put in place to keep it up to date.

Opportunities for improvement

No opportunities for improvement have been identified in respect of this obligation.

⁶¹ Email entitled “Re: Working draft report” from Subrat Kar of VWST to Dan Deere at 10:29 on 26 June 2019.

Table A.7 WQP (npw) element seven

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.7(1)(b)	Element seven The WQP (npw) outlines operator, contractor and end user awareness and training requirements.	Compliant
Risk	Target for Full Compliance	
Inadequate training and awareness of employees presents a risk of poor management of the recycled water supply scheme.	Adequate training and awareness of employees.	
Evidence sighted		
<ul style="list-style-type: none"> ▪ Interviews with VWST personnel on 25 June 2019. ▪ Site inspections of infrastructure on 25 June 2019. ▪ VWST, Water Quality Plan (DW-WQP-001-06) Rev 6, dated 1 May 2019. 		
Summary of reasons for grade		
<p>The <i>Water Quality Plan</i> outlines the arrangements in respect of operator, contractor and end user training and awareness. Observations made during this and previous audits of VWST schemes indicate that those arrangements are effectively implemented.</p> <p>On that basis, VWST is assessed to have demonstrated compliance with this obligation.</p>		
Discussion and notes		
Overview:		
<p>General details of the arrangements in respect of employee training and awareness are outlined in the <i>Water Quality Plan</i>.⁶² More specific arrangements in relation to training and awareness are discussed in the following.</p>		
Operator, contractor and end user awareness and involvement:		
<p>The <i>Water Quality Plan</i>⁶³ indicates that staff are inducted before working on the site and notes the broad obligations for both VWST and JLL. The latter relates to restrictions on the use of recycled water. Further details are given in the section immediately below.</p>		
Operator, contractor and end user training:		
<p>The <i>Water Quality Plan</i>⁶⁴ outlines the specific experience, qualifications, awareness and training that are required. Particular detail is provided in relation to system operators. VWST HR manages the training, seminar attendance, etc. The weakness is clarity around end user awareness which is deferred to JLL and for which details are not provided. It is understood that this lies outside of the battery limits of this licence and audit but this needs to be clarified as detailed in Table A.3 and its associated recommendation (REC-DW-2019.03).</p>		
Recommendations		
There are no recommendations in respect of this obligation.		
Opportunities for improvement		
No opportunities for improvement have been identified in respect of this obligation.		

⁶² *Water Quality Plan*, section 11.7.

⁶³ *Water Quality Plan*, section 11.7.1.

⁶⁴ *Water Quality Plan*, section 11.7.2.

Table A.8 WQP (npw) element eight

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.7(1)(b)	Element eight The WQP (npw) outlines the process for community awareness and involvement.	Compliant
Risk	Target for Full Compliance	
Inadequate community consultation, awareness and involvement present a risk of poor management of the recycled water supply scheme.	Adequate community consultation, awareness and involvement.	
Evidence sighted		
<ul style="list-style-type: none"> ▪ Interviews with VWST personnel on 25 June 2019. ▪ Site inspections of infrastructure on 25 June 2019. ▪ VWST, Water Quality Plan (DW-WQP-001-06) Rev 6, dated 1 May 2019. 		
Summary of reasons for grade		
<p>VWST has sufficiently documented its process for community awareness and involvement in the <i>Water Quality Plan</i>. These processes, which are principally reliant on web-based mechanisms for both communication and feedback, are considered appropriate.</p> <p>Accordingly, VWST is assessed to have demonstrated compliance with this obligation.</p>		
Discussion and notes		
Overview:		
<p>Details of the process for community consultation, awareness and involvement are outlined in the <i>Water Quality Plan</i>.⁶⁵ An internet site⁶⁶ provides clear community-focused details on the scheme. More specific arrangements are discussed in the following.</p>		
Consultation with users of recycled water and the community:		
<p>The <i>Water Quality Plan</i>⁶⁷ indicates that JLL will largely interact with the final users of the recycled water and community but details are not provided. However, if VWST's responsibility, and the responsibilities of each party among Sydney Water, VWST and JLL, are not clearly defined in licence, sewer mining agreement and contract, respectively, then whatever is written in the WQP is one view of what the arrangements might be but is not formalised. For the purposes of this audit it was understood that the battery limits of the licence and audit were limited in line with the WQP; but this needs to be clearly agreed in writing by IPART, Sydney Water and JLL as detailed in Table A.3 and its associated recommendation (REC-DW-2019.03).</p>		
Communication and education:		
<p>The <i>Water Quality Plan</i>⁶⁸ indicates that JLL will largely interact with the community and provide suitable education but details are not provided. However, it is understood that this outside of the battery limits of this licence and audit. As above, for the purposes of this audit it was understood that the battery limits of the licence and audit were limited in line with the WQP; but this needs to be clearly agreed in writing by IPART, Sydney Water and JLL as detailed in Table A.3 and its associated recommendation (REC-DW-2019.03).</p>		
Recommendations		

⁶⁵ *Water Quality Plan*, section 11.8.

⁶⁶ www.myrecycledwater.com.au

⁶⁷ *Water Quality Plan*, section 11.8.1.

⁶⁸ *Water Quality Plan*, section 11.8.2.

There are no recommendations in respect of this obligation.

Opportunities for improvement

No opportunities for improvement have been identified in respect of this obligation.

Table A.9 WQP (npw) element nine

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.7(1)(b)	Element nine The WQP (npw) outlines the validation, research and development processes for the scheme.	Non-compliant (non-material)

Risk	Target for Full Compliance
Inadequate validation of processes and procedures presents a risk of poor management of the recycled water supply scheme.	Adequate methodology for validating processes and procedures to ensure that the system is effective at controlling hazards.

Evidence sighted

- Interviews with VWST personnel on 25 June 2019.
- Site inspections of infrastructure on 25 June 2019.
- VWST, Water Quality Plan (DW-WQP-001-06) Rev 6, dated 1 May 2019.
- VWST, *Validation Plan*, versions seen dated to 7 April 2011 and 25 August 2011.
- Koch Membrane Systems, *Veolia Presentation February 9 2012*, PDF file.
- Koch Membrane Systems, *PURON® Hollow Fiber Modules, Hollow Fiber Submerged Membrane Modules for MBR Applications, 5/15 Rev 1* (dated variously to 2011 and 2012).
- VWST, *Darling Quarter development, Recycled Water Treatment Plant, Final Performance Report (15/08 - 16/09/11), Validation Plan*, dated 23 September 2011.

Summary of reasons for grade

VWST has outlined its approach in relation to its validation of processes in the *Water Quality Plan*. These processes include both desktop (technology assessment) and practical (onsite monitoring) validation processes, which are appropriate for the scheme. More specific detail is presented in a *Validation Plan*.

Design of infrastructure by appropriately qualified personnel in accordance with industry standards provides the basis for continuing reliability.

The validation information is broadly compliant but lacked sufficient specific detail and currency to be compliant with modern standards of validation. VWST was able to find some of those details by the time of final reporting and was able to demonstrate no material non-compliance, but hadn't updated the *Water Quality Plan* to include those details and still had some outstanding actions to complete and, as such, a non-material non-compliance is reported.

Discussion and notes

Overview:

Details of the validation processes for the scheme are outlined in the *Water Quality Plan*.⁶⁹ Specific arrangements are discussed in the following.

Validation of processes:

The *Water Quality Plan*⁷⁰ cites a *Validation Plan* that summarises the validation of its treatment processes including the detail of the validation of the suitability of the adopted treatment processes for the Darling Quarter scheme. The reference was not explicit and needs to be made explicit and is probably referring to the VWST *Water Quality Validation Plan*, (albeit various versions being found on file and the

⁶⁹ *Water Quality Plan*, section 11.9.

⁷⁰ *Water Quality Plan*, section 11.9.1.

specific version that is cited wasn't given in the *Water Quality Plan*)⁷¹ or a post-testing document.⁷² In either case, the *Validation Plan* is out of date by modern standards, as follows:

- The use of a PURON MBR with Koch PSH500C2-17/01D membranes was cited in the *Validation Plan*. The California Title 22 process was mentioned briefly as evidence for the validation of the unit, which uses turbidity and not pressure decay rate as a critical limit. However, the specific reference was missing and the *Validation Plan* simply referred to the California Title 22 process in the general sense. A specific validation report or reference other than a very general reference to the Title 22 process wasn't available during the audit. Following the audit VWST was able to source a presentation from Koch⁷³ along with a product promotional brochure⁷⁴ that stated that the membrane was certified against the Californian Title 22 process. But the evidence wasn't cited in the *Water Quality Plan*; nor was any subordinate document including (for example) the *Validation Plan*.
- The chlorine CT was stated to be 20 mg•min/L in the *Validation Plan* but no basis for this calculation, or its adequacy, was provided. In addition, recently published WaterVal protocols show that in some cases at a high enough pH and low enough temperature a higher CT may be required. The CT should be updated and the basis of its estimation provided. Note that given the design of the scheme a quick calculation by the operator showed that the actual CT is likely to be way above the minimum required and so no public health or compliance concern was raised. For instance, there is of the order 150 kL volume in the final water tanks, which are mixed, and considered never to fall below half full, with a flow rate of approximately 6.5, and not more than, 7 kL/hr.
- The validated Aquafides 1AF400T UV disinfection system was found by the operator to be validated to provide a dose of > 40 mJ/cm² for a stated UVT of ≥ 80%. However, the name plate on the reactor showed a minimum UVT of 68% (Figure 3). In practice the performance has been higher, of the order 99%, given the RO process. Nonetheless, some explanation of how VWST will remain confident that it knows what the critical lower limiting UVT is, either 68% or 80%, and that the UVT is not below that limit, and that the flow rate will not exceed the upper limit within which the validation is warranted. This information is not provided in the *Water Quality Plan*, any document cited in the *Water Quality Plan*, nor the *Validation Plan*.

The RO unit probably requires no update since the critical limit is simply based on the change in EC, as explained in the *Validation Plan*, and this is a robust control.

Overall, the *Water Quality Plan* does not provide sufficient and clearly cited documents of sufficient currency that it can be considered to provide a modern standard of evidence to fully comply with validation obligations. Given that evidence could be sourced and calculations completed during and after the audit to satisfy the auditor that there was no material non-compliance, a non-material non-compliance is noted. A recommendation (**REC-DW-2019.05**) for rectification of the non-compliance is made.

Design of equipment:

The *Water Quality Plan*⁷⁵ cites a *Validation Plan* that has evidence showing that the equipment was suitably designed with the treatment systems being assigned appropriately conservative pathogen log reduction values given specified operating critical limits. The site-specific and desktop evidence was consistent with the validation claimed. The process should reliably control hazards to ensure fit for purpose water with a comfortable safety margin. A commissioning verification process entailed testing of 28 samples over five weeks to confirm performance of the pre-validated technologies and was considered appropriate; a report on that program was provided following the audit.⁷⁶ As noted above, however, there is a need to update this evidence, and recommendations to do so are made.

Investigative studies and research monitoring:

⁷¹ VWST, *Validation Plan*, versions seen dated to 7 April 2011 and 25 August 2011.

⁷² VWST, Darling Quarter development, Recycled Water Treatment Plant, Final Performance Report (15/08 - 16/09/11), *Validation Plan*, 23 September 2011.

⁷³ Koch Membrane Systems, *Veolia Presentation February 9 2012*, PDF file.

⁷⁴ Koch Membrane Systems, PURON® Hollow Fiber Modules, Hollow Fiber Submerged Membrane Modules for MBR Applications, 5/15 Rev 1.

⁷⁵ *Water Quality Plan*, section 11.9.2.

⁷⁶ VWST, Darling Quarter development, Recycled Water Treatment Plant, Final Performance Report (15/08 - 16/09/11), *Validation Plan*, 23 September 2011.

The *Water Quality Plan*⁷⁷ indicates that VWST will collaborate across its business globally to review data to help continually increase understanding of systems and as the basis of any improvement initiatives.

Response to feedback from NSW Health:

Feedback from NSW Health provided to VWST in an email dated 31 May 2019 that set out, among other things, the following request relevant to this component of the audit:

“In 11.5.1 the free chlorine in the treated water is listed as 0.2-2 mg/L as the range for ‘potential critical limits’. What is the C.t. achieved with 0.2 mg/L? The plan claims 4 LRV for bacteria and virus.”

This is discussed in the *Validation of processes* subsection of this table under the second bullet point and was found to be non-compliant (non-material); as noted above, a recommendation (**REC-DW-2019.05**) that covers this among other non-compliant items is made.

Recommendations

REC-DW-2019.05: It is recommended that VWST update its *Water Quality Plan*, either through modifying the Plan, or adding a reference to one or more explicitly cited documents, such that it is very clear precisely which documents, and versions of those documents, are relied upon to provide validation. In relation to the membrane, the explicit citations need to be added although the evidence available to VWST appears sufficient. In relation to the UV disinfection system the evidence appears sufficient but the specific lower limiting UVT needs to be documented and cited and a detailed explanation of why online UVT monitoring is not required should be added to justify not having a UVT measurement online to ensure that the UV disinfection system is operating within its validated UVT range. In relation to the chlorine dosing system, a reasonable basis should be given to explain the adequacy of the chlorine dose, given the temperature, pH, turbidity, contact time and chlorine concentration dynamic range of operation and the target pathogen under consideration.

Opportunities for improvement

No opportunities for improvement have been identified in respect of this obligation.

⁷⁷ *Water Quality Plan*, section 11.9.3.

Table A.10 WQP (npw) element ten

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.7(1)(b)	Element ten The WQP (npw) outlines the process for management of documentation and records as well as the reporting requirements.	Non-compliant (non-material)
Risk Inadequate documentation, records and reporting presents a risk of poor management of the recycled water supply scheme.		Target for Full Compliance Adequate documentation, records and reporting.
Evidence sighted		
<ul style="list-style-type: none"> ▪ Interviews with VWST personnel on 25 June 2019. ▪ Site inspections of infrastructure on 25 June 2019. ▪ VWST, Water Quality Plan (DW-WQP-001-06) Rev 6, dated 1 May 2019. 		
Summary of reasons for grade		
<p>VWST has detailed its processes for the management of documentation and records and complying with reporting requirements in the <i>Water Quality Plan</i>. These processes are managed by VWST at a corporate level through implementation of policies and procedures.</p> <p>The <i>Water Quality Plan</i>, including the process flow diagram and SCADA screens have yet to be fully revised to comply with the WICA section 16 Order⁷⁸ to:</p> <ul style="list-style-type: none"> b) include measures to ensure that historical flow data for treated water discharged from the treatment plant, or similar alternative information, is retained as evidence to demonstrate that out-of-specification water has not been delivered into supply, in particular, flow monitoring downstream of the diversion of out-of-specification water back to the treatment train or records of the open or close status of valves at the diversion point. <p>Since the infrastructure upgrade has been completed and records from the SCADA system were shown to prove that it was working, this finding was considered to represent a non-compliance of a non-material nature and, as such, a non-material non-compliance is reported.</p>		
Discussion and notes		
Overview:		
<p>Details of processes for the management of documentation and records and complying with reporting requirements are outlined in the <i>Water Quality Plan</i>.⁷⁹ It is noted that VWST has a set of ISO quality management systems. Specific arrangements are discussed in the following.</p>		
Management of documentation and records:		
<p>VWST makes general reference to in its <i>Water Quality Plan</i>⁸⁰ to documents and records but within the body of the Plan these are very concise, not specific and in many cases referred to in the future tense.</p>		
<p>Different parts of the Plan refer to various versions of VWST's management systems. Some areas refer to a Business Management System certified to the international standards for Occupational Health & Safety (AS/NZS 4801:2001 & OHSAS 18001:2007), Environmental (AS/NZS ISO 14001:2016) and Quality</p>		

⁷⁸ IPART, "Order under section 16 of the *Water Industry Competition Act 2006* (WICA): Requirement to revise and audit for adequacy the *Water Quality Plan* for the Darling Walk scheme and pay a monetary penalty of \$5,000", dated 10 April 2019, IPART reference D19/8808.

⁷⁹ *Water Quality Plan*, section 11.10.

⁸⁰ *Water Quality Plan*, section 11.10.1.

(AS/NZS ISO 9001:2016) Management Systems.⁸¹ Other areas refer to ISO 9001:2015 and ISO 14001:2015.⁸² The scheme is in the scope of these management systems since they cover VWST to design, construct and operate schemes, including Darling Walk. Hence, it is considered that the scheme is covered within the ISO systems relating to VWST.

VWST is moving to a new APAC system for cloud-based document management so at present documents sit in the server as well as on the cloud. The system captures all the routine monitoring records, e.g. SCADA data and verification data. Records captured include instrument calibration and verification data, SCADA histories for online instruments, laboratory test results including the NATA accredited certificates, operator cross-checks on instruments such as turbidity, conductivity, pH and chlorine and online and onsite CCP weekly check records.

Reporting:

Reporting requirements are identified in the *Water Quality Plan*.⁸³ These include internal reporting for operational purposes and external reporting to parties such as IPART.

Response to the Order under WICA section 16:

The Order under WICA section 16 required the auditor to assess whether the WQP (npw) was revised to:

- b) include measures to ensure that historical flow data for treated water discharged from the treatment plant, or similar alternative information, is retained as evidence to demonstrate that out-of-specification water has not been delivered into supply, in particular, flow monitoring downstream of the diversion of out-of-specification water back to the treatment train or records of the open or close status of valves at the diversion point.

The need for such a system was identified under a previous audit.⁸⁴ VWST has now set up a system for capturing SCADA records to show valve positions for an additional three valves and a flow meter to enable VWST to show when water that is off-spec it is diverted. A new flow meter was added for that purpose (this was seen in the plant during the audit). This represents a good initiative to help prove compliance. However, the *Water Quality Plan*, including the process flow diagram and SCADA screens have yet to be fully revised to capture this arrangement. Since the infrastructure upgrade has been completed and records from the SCADA system were shown to prove that it was working, this finding was considered to represent a non-compliance of a non-material nature and a recommendation (**REC-DW-2019.06**) was identified to revise the *Water Quality Plan* to summarise the revised system.

Recommendations

REC-DW-2019.06: It is recommended that VWST update its *Water Quality Plan* to include measures to ensure that historical flow data for treated water discharged from the treatment plant, or similar alternative information, is retained as evidence to demonstrate that out-of-specification water has not been delivered into supply, in particular, flow monitoring downstream of the diversion of out-of-specification water back to the treatment train or records of the open or close status of valves at the diversion point.

Opportunities for improvement

No opportunities for improvement have been identified in respect of this obligation.

⁸¹ *Water Quality Plan*, section 11.1.4 and 11.6.2.

⁸² *Water Quality Plan*, section 11.10.

⁸³ *Water Quality Plan*, section 11.10.2.

⁸⁴ Cobbitty Consulting, *Veolia (Darling Walk) Non-Potable Water Scheme, 2018 Operational Audit Version 4.1*, 12 March 2019.

Table A.11 WQP (npw) element eleven

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.7(1)(b)	Element eleven The WQP (npw) outlines the process for long-term evaluation of results and the audit of the documentation.	Compliant
Risk	Target for Full Compliance	
Inadequate long-term evaluation and audit presents a risk of poor management of the recycled water supply scheme.	Adequate long-term evaluation and audit.	
Evidence sighted		
<ul style="list-style-type: none"> ▪ Interviews with VWST personnel on 25 June 2019. ▪ Site inspections of infrastructure on 25 June 2019. ▪ VWST, Water Quality Plan (DW-WQP-001-06) Rev 6, dated 1 May 2019. 		
Summary of reasons for grade		
<p>The <i>Water Quality Plan</i> outlines the process for the long-term evaluation of results and audit of the <i>Plan</i>. Accordingly, VWST is assessed to have demonstrated compliance with this obligation.</p>		
Discussion and notes		
Overview:		
<p>Details of processes for the long-term evaluation of results and the audit of the <i>Water Quality Plan</i> are outlined in the <i>Water Quality Plan</i>.⁸⁵ Specific arrangements are discussed in the following.</p>		
Long-term evaluation of results:		
<p>The <i>Water Quality Plan</i>⁸⁶ indicates that review of monitoring results occurs annually. An IPART report is submitted and that includes water quantity and water quality data; water quality only by exception. Exception reporting to JLL occurs monthly and annually to IPART. No systematic long-term data analysis other than following up exceptions takes place. The scale and nature of the plant wasn't considered to warrant any more assessment given that the operator is trained and keeps an eye on performance. For instance, the RO plant recently changed its membranes based on operator feedback.</p>		
Audit of recycled water quality management:		
<p>The <i>Water Quality Plan</i>⁸⁷ indicates that VWST will conduct internal audits and be subject to external audits including WICA audits and audits against the ISO 9001, ISO 14001, and AS 4801 standards, by an independent accredited certifying body. VWST refers to its WHSEQ and Compliance Systems Manager and its certified Business Management System (BMS) as being subject to audit. The Darling Walk scheme was found to be within the scope of these management systems.</p>		
<p>It was noted that whilst VWST has clearly demonstrated its capability with respect to design and operation of the scheme and compliance with its contract, it has struggled to respond in a timely manner to the broader administrative requirements from IPART and NSW Health, noting the section 16 Order (under which this audit was required). For instance, VWST did not update its WQP (npw) and fully address the requirements in a timely manner as evidenced by the remaining non-compliances reported in this audit, albeit that they are deemed non-material due to the technical and contractual quality of the work done. As an opportunity for improvement, (OFI-DW-2019.02), it is suggested that VWST reviews the level and types of resource committed to the management, administration and compliance requirements of the scheme,</p>		

⁸⁵ *Water Quality Plan*, section 11.11.

⁸⁶ *Water Quality Plan*, section 11.11.1.

⁸⁷ *Water Quality Plan*, section 11.11.2.

beyond the technical and contractual, and makes appropriate adjustments. JLL may need to be involved in these adjustment since they may need to be reflected in a future revision to the contract.

Recommendations

There are no recommendations in respect of this obligation.

Opportunities for improvement

OFI-DW-2019.02: VWST should review the level and types of resource committed to the management, administration and compliance requirements of the scheme, beyond the technical and contractual, and makes appropriate adjustments. JLL may need to be involved in these adjustment since they may need to be reflected in a future revision to the contract.

Table A.12 WQP (npw) element twelve

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.7(1)(b)	Element twelve The WQP (npw) outlines a process for review and continual improvement.	Compliant
Risk	Target for Full Compliance	
An inadequate process for review and continual improvement a risk of poor management of the recycled water supply scheme.	Adequate processes for review and continual improvement.	
Evidence sighted		
<ul style="list-style-type: none"> ▪ Interviews with VWST personnel on 25 June 2019. ▪ Site inspections of infrastructure on 25 June 2019. ▪ VWST, Water Quality Plan (DW-WQP-001-06) Rev 6, dated 1 May 2019. 		
Summary of reasons for grade		
<p>The <i>Water Quality Plan</i> outlines the process for review and continual improvement of its recycled water quality management system. The arrangements for conducting management reviews and the process for identifying and implementing improvements are considered to be appropriate.</p> <p>Accordingly, VWST is assessed to have demonstrated compliance with this obligation.</p>		
Discussion and notes		
Overview:		
<p>Details of processes for review and continual improvement are outlined in the <i>Water Quality Plan</i>.⁸⁸ Specific arrangements are discussed in the following.</p>		
Review by senior managers:		
<p>The <i>Water Quality Plan</i>⁸⁹ indicates that the VWST WHSEQ and Compliance Systems Manager oversees reporting to senior management; typically following his periodic internal audit.</p>		
Recycled water quality management improvement plan:		
<p>The <i>Water Quality Plan</i>⁹⁰ indicates that improvements are undertaken from time to time albeit without providing explicit details. A technical review was recently completed and looked at turbidity and made recommendations to move to a more modern filtration unit with a certified LRV based on pressure decay.</p>		
Recommendations		
<p>There are no recommendations in respect of this obligation.</p>		
Opportunities for improvement		
<p>No opportunities for improvement have been identified in respect of this obligation.</p>		

⁸⁸ *Water Quality Plan*, section 11.12.

⁸⁹ *Water Quality Plan*, section 11.12.1.

⁹⁰ *Water Quality Plan*, section 11.12.2.

Photographic evidence



Figure 1. Backflow prevention device with current test tag on the potable water top up feed line.



Figure 2. Recycled water signage in the toilets in the building.

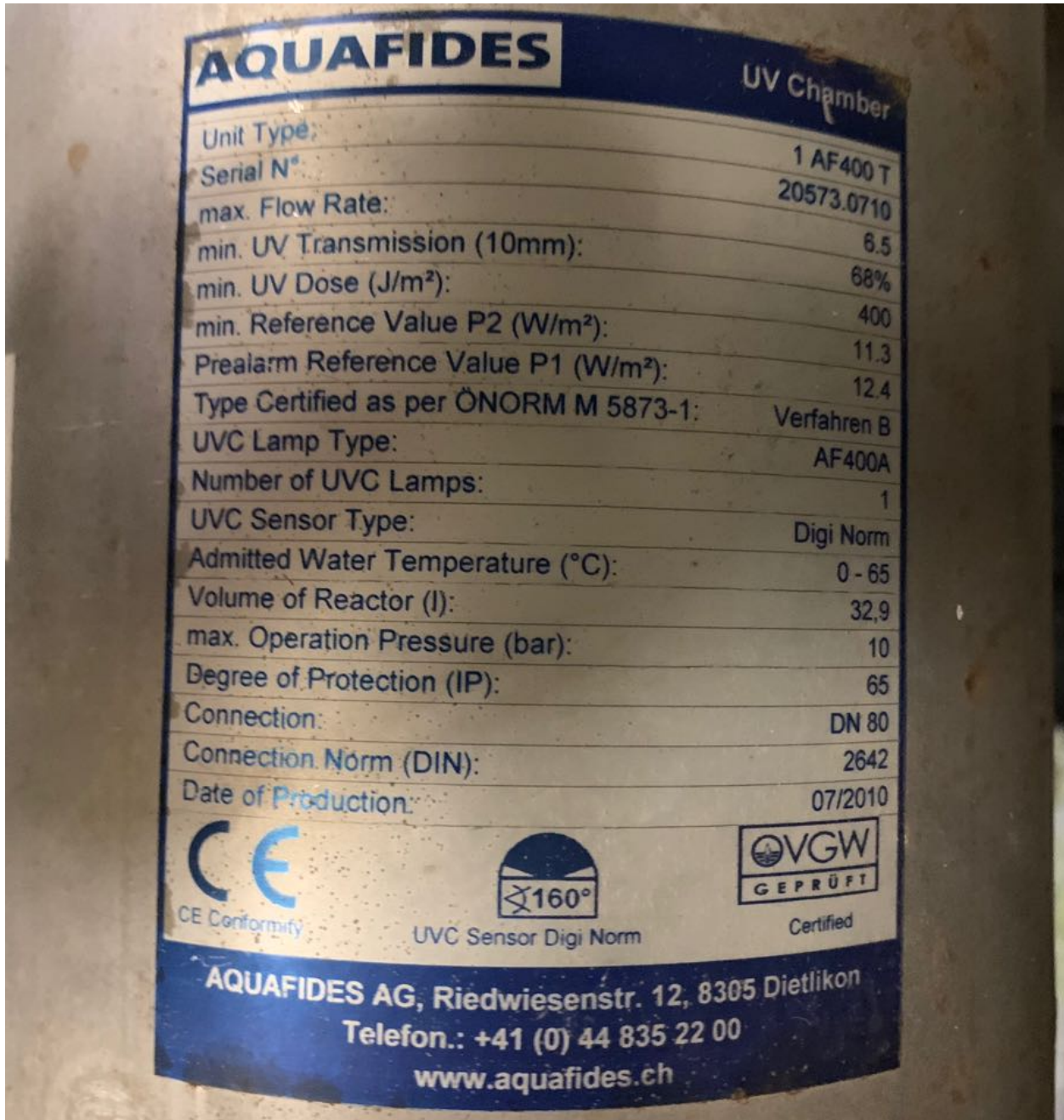


Figure 3. UV disinfection system plate.