

## **WICA Audit Report to IPART**

### **Licence Plan Audit (Sewerage)**

### **Aquacell (Kurrajong)**

Independent Pricing and Regulatory Tribunal  
*Water Industry Competition Act 2006*

Network Operator's Licence Audit Report

Licence No. 15\_032: Aquacell Pty Ltd

Licence Holder: Aquacell Pty Ltd (ACN 072 487 015)

Document Version 4, issued 02 February 2016



# Table of Contents

<b>1. EXECUTIVE SUMMARY .....</b>	<b>3</b>
<b>2. INTRODUCTION .....</b>	<b>4</b>
2.1 OBJECTIVE.....	4
2.2 LICENSEE'S INFRASTRUCTURE, SYSTEMS AND PROCEDURES.....	4
2.3 AUDIT METHOD.....	4
<i>Audit scope</i> .....	4
<i>Audit standard</i> .....	4
<i>Audit steps</i> .....	5
<i>Audit team</i> .....	5
<i>Acknowledgements</i> .....	5
<i>Audit grades</i> .....	5
2.4 REGULATORY REGIME.....	5
2.5 AUDIT FINDINGS .....	5
<b>3. INFRASTRUCTURE OPERATING PLAN.....</b>	<b>6</b>
3.1 SUMMARY OF FINDINGS .....	6
3.2 REVIEW OF ACTIONS .....	6
3.3 OPPORTUNITIES FOR IMPROVEMENT .....	6
<b>4. SEWERAGE MANAGEMENT PLAN.....</b>	<b>7</b>
4.1 SUMMARY OF FINDINGS .....	7
4.2 REVIEW OF ACTIONS .....	7
4.3 OPPORTUNITIES FOR IMPROVEMENT .....	7

## APPENDICES

# 1. Executive Summary

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

The subject matter of the audit was the infrastructure that is operated under Network Operator's Licence No. 15\_032 for the sewerage services at the Tallowood Residential Community Development, Kurrajong. The Licence Holder is Aquacell Pty Ltd (ACN 072 487 015).

The scope of the audit was a Licence Plan audit of the management plans required under the Licence as they relate to the sewerage infrastructure. The Licence Plans subjected to audit were as follows:

- *Infrastructure Operating Plan (IOP)*; and
- *Sewage Management Plan (SMP)*.

The auditors were provided with sufficient and appropriate evidence, as described in *IPART Audit Guideline Water Industry Competition Act 2006 Water – Guidelines (July 2013)*, on which to base the conclusions reached during the audit.

The auditors have observed the requirements of the *IPART Audit Guideline Water Industry Competition Act 2006 Water – Guidelines (July 2013)* 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 auditors. The findings have not been unduly influenced by the Licence Holder or any of its associates and express the auditors' opinions as to whether the Licence Holder 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.

The Licence Holder (Aquacell Pty Ltd) was found to be constructing, repairing, maintaining and operating the infrastructure in compliance with all of the assessed audit criteria; no non-compliances were recorded. A total of five (5) opportunities for improvement were identified.

In summary, provisions of the *Infrastructure Operating Plan* and the *Sewerage Management Plan* relating to the audited sewerage infrastructure were adequately compliant with of the relevant guidelines, standards, and legal and formal requirements.

## 2. Introduction

### 2.1 Objective

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

The subject matter of the audit was the infrastructure that is operated under network operator's Licence No. 15\_032 for the sewerage services at Tallowood Residential Community Development, Kurrajong. The Licence Holder is Aquacell Pty Ltd (ACN 072 487 015) (Aquacell).

The scope of the audit was a compliance audit of the management plans required under the Licence. The Licence Plans subject to audit were as follows:

- *Infrastructure Operating Plan (IOP)*; and
- *Sewerage Management Plan (SMP)*.

### 2.2 Licensee's infrastructure, systems and procedures

The Licence Holder's infrastructure, systems and procedures audited were those related to the Tallowood Residential Community Development, Kurrajong (the Scheme).

Aquacell is the Licence Holder, holding Network Operator's Licence No. 15\_032. Aquacell is responsible for the operation and maintenance of the sewerage system, which comprises a sewage collection system (reticulation network), treatment plant and effluent disposal (irrigation) system.

There are no 'Authorised Persons' named under this Licence.

### 2.3 Audit method

#### Audit scope

This compliance audit covers design, construction, operation, repair and maintenance of the Scheme and addresses the scope of the Licence Plan audit for the following plans:

- *Infrastructure Operating Plan (IOP)*; and
- *Sewerage Management Plan (SMP)*.

#### 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 Water – Guidelines (July 2013)* (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 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 Licence Holder prior to the audit occurring. The Licence Holder supplied documentation to both the auditor and IPART during and subsequent to the audit.

The audit, which comprised of a site inspection and an office based desktop audit, took place on Monday, 18 January 2016. Further desktop auditing took place following the site audit. A draft Audit Report was submitted on 26 January 2016. Additional evidence was provided up until 29 January 2016.

The audit process involved seeking objective evidence that the Licence Holder met the audit criteria set by IPART. The auditors collected evidence through interview, document review and site inspection. The auditors randomly sampled examples sufficient to verify claims made by the Licence Holder.

Quality was assured using a professional review process; each auditor's work was reviewed and approved by the other auditor.

### Audit team

For efficiency, the various components of the audit were audited in an integrated manner. This document sets out the detailed audit agenda and audit criteria that were applied. The two-member team that conducted the audits included:

- Overall audit management and reporting of the SMP components: Dr Dan Deere.
- Audit of the IOP components: Mr Jim Sly.

### Acknowledgements

The audit team notes, and greatly appreciates:

- the work and effort put in by those audited, including Aquacell staff Justin Taylor and Warren Johnson; and
- the presence of IPART representative, Derek Low as an observer and commentator during the audit.

### Audit grades

Audit grades were awarded as recommended in the WICA Audit Guideline.

## 2.4 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. 15\_032 made under the above framework (as issued on 26<sup>th</sup> July 2015).
- IPART *Audit Guideline Water Industry Competition Act 2006 Water – Guidelines (July 2013)* 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.

## 2.5 Audit findings

Audit findings are summarised in section 1, Executive Summary, in more detail in sections 3, 4 and 5, and in full detail in the following Appendices:

- Appendix 1 for the *Infrastructure Operating Plan* (IOP); and
- Appendix 2 for the *Sewerage Management Plan* (SMP).

## 3. Infrastructure Operating Plan

### 3.1 Summary of findings

Aquacell has been assessed as being fully compliant with the requirements of Schedule 1 clause 6(1) of the *Water Industry Competition (General) Regulation 2008*.

### 3.2 Review of actions

Following issue of the draft audit report, Aquacell provided the following updated documentation which addresses an insignificant non-compliance that was initially raised in respect of WIC Reg Sched 1 cl.13(1)(a):

- Aquacell, *Infrastructure Operating Plan; Blackwater Disposal Scheme; Tallowood Residential Community Development, Kurrajong NSW 2758 (Revision 4)*, 28 January 2016.
- Aquacell, *Kurrajong Hamlet; Tallowood Residential Estate; Operation and Maintenance Manual; Sewage Network, Water Treatment Plant, Irrigation Disposal (Revision A0069-3)*, 28 January 2016.

Review of the updated documentation led to the assessment that Aquacell has now demonstrated full compliance with the requirements of WIC Reg Sched 1 cl.13(1)(a).

### 3.3 Opportunities for improvement

Three (3) opportunities for improvement have been identified in respect of the *Infrastructure Operating Plan* as a result of this audit. It is suggested that Aquacell:

- continue to take action to ensure that operation of the SCADA link is restored as soon as possible, thereby ensuring that treatment plant performance can be monitored in accordance with the documented arrangements;
- consider labelling the treated water tank to indicate that it contains recycled water; and
- take action to collect and divert groundwater seepage, thereby:
  - ensuring that the waste sludge tank remains in a state of operational readiness for its intended purpose without the need for prior dewatering; and
  - eliminating potential longer term instability of the embankment from which the seepage is occurring.

## 4. Sewerage Management Plan

### 4.1 Summary of findings

Aquacell was assessed as being fully compliant with the requirements of Schedule 1 clause 14(1) of the *Water Industry Competition (General) Regulation 2008*.

### 4.2 Review of actions

Following issue of the draft audit report, Aquacell provided the following updated documentation which addresses an insignificant non-compliance that was initially raised in respect of WIC Reg Sched 1 cl.14(1)(b):

- Aquacell, Kurrajong Hamlet; Tallowood Residential Estate; *Operation and Maintenance Manual; Sewage Network, Water Treatment Plant, Irrigation Disposal (Revision A0069-3)*, 28 January 2016.

Review of the updated documentation led to the assessment that Aquacell has now demonstrated full compliance with the requirements of WIC Reg Sched 1 cl.14(1)(b).

### 4.3 Opportunities for improvement

Two (2) opportunities for improvement have been identified in respect of the *Sewage Management Plan* as a result of this audit. It is suggested that Aquacell:

- Consult with the EPA to determine what the “material harm” trigger level should be for notification of sewer spills at this site.
- Implements a process to trigger review of its Licence Plans at regular pre-determined intervals.



## Appendix A Detailed Audit Findings – Infrastructure Operating Plan (IOP)

Table A1.1 IOP Audit Table – WIC Reg Sched 1 cl.13(1)(a)

Clause	Requirement	Compliance Grade
<b>WIC Reg Sched 1 cl.13(1)(a)</b>	The IOP indicates the arrangements in relation to the design, construction, operation and maintenance of the infrastructure, including particulars as to the life-span of the infrastructure, the system redundancy built into the infrastructure and the arrangements for renewal of the infrastructure.	<b>Complaint</b>
<b>Risk</b>	<b>Target for Full Compliance</b>	
This presents a high operational risk. Knowledge of the capacity and constraints associated with the infrastructure is essential to the effective management of the infrastructure assets in delivering agreed levels of service.		Full development of the Infrastructure Operating Plan, including development of an Asset Management Plan and demonstrated implementation of the infrastructure management practices documented therein.
<b>Evidence sighted</b>		
<ul style="list-style-type: none"> <li>Interviews with Aquacell personnel.</li> <li>Site inspection undertaken on 18 January 2016.</li> <li>Aquacell, <i>Infrastructure Operating Plan; Blackwater Disposal Scheme; Tallowood Residential Community Development, Kurrajong NSW 2758 (Revision 3)</i>, 11 January 2016 [subsequently revised].</li> <li>Aquacell, <i>Infrastructure Operating Plan; Blackwater Disposal Scheme; Tallowood Residential Community Development, Kurrajong NSW 2758 (Revision 4)</i>, 28 January 2016.</li> <li>Aquacell, <i>Tallowood Residential Community Development – Kurrajong NSW; Sewage Management Plan (Revision 3)</i>, 7 January 2016.</li> <li>Aquacell, <i>Kurrajong Hamlet; Tallowood Residential Estate; Operation and Maintenance Manual; Sewage Network, Water Treatment Plant, Irrigation Disposal (Revision A0069-2)</i>, 11 January 2016 [subsequently revised].</li> <li>Aquacell, <i>Kurrajong Hamlet; Tallowood Residential Estate; Operation and Maintenance Manual; Sewage Network, Water Treatment Plant, Irrigation Disposal (Revision A0069-3)</i>, 28 January 2016.</li> <li>Harris Page and Associates, Drawings 5460/H-01, H-02 and H-03 (Rev D), <i>Kurrajong Hamlet; Hydraulic Services Site Plan Sheets 1, 2 and 3</i> (respectively).</li> <li>Aquacell, Drawing A0069-PID-01 (Rev E), <i>Kurrajong; Aquacell Black Water Plant 20kL/d; Process and Instrumentation Diagram</i>.</li> <li>Kenrahn, Drawings TWS81-15/2 and 15/3 (Issue 001), <i>6 Station 240 Volt DOL Turf Watering Starter</i>.</li> <li>Woodlots and Wetlands, <i>Effluent management Investigations at Vincent Road, Kurrajong (Version 2)</i>, 15 November 2012 [Appendix B to the <i>Sewage Management Plan</i>].</li> <li>Hawkesbury City Council, <i>Notice of Determination of a Development Application</i> in respect of Development Application No: DA0466/14 and covering letter dated 16 October 2015.</li> <li>Hawkesbury City Council, <i>Hawkesbury Development Control Plan; Appendix E – Civil Works Specification</i>, undated.</li> </ul>		



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## Summary of reasons for grade

The *Infrastructure Operating Plan*, in conjunction with the *Operations and Maintenance Manual* and *Sewage Management Plan*, indicates the arrangements in relation to the design, construction, operation and maintenance of the infrastructure and life cycle management of the assets. Accordingly, Aquacell is considered to have demonstrated full compliance with this requirement.

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## Discussion and notes

### Overview:

Sewerage infrastructure at the Tallowood Residential Community Development, Kurrajong that is to be operated and maintained by Aquacell comprises:<sup>1</sup>

- Gravity sewer reticulation from each dwelling to a single 100kL collection tank;
- A blackwater treatment plant; and
- Treated effluent sub-surface irrigation, including irrigation reticulation.

Aquacell's responsibility for operation and maintenance commences at the property connection to the reticulation sewers and includes all components of the downstream infrastructure. All infrastructure is owned by the Tallowood Community Association.

Wastewater is/will be sourced from each of 41 dwellings and transported via the reticulation network to the 100kL buffer tank, which will provide approximately 8 days storage when full development has been realised. The treatment plant has a design capacity of 20kL/day, which is greater than the expected maximum flow from the Tallowood Development (approximately 12.2kL/day). Treated water is discharged into a 46kL storage tank from where it is distributed for sub-surface irrigation. The designated irrigation area is within the boundaries of the development, which has restricted access to the community and public.

It is noted that the *Infrastructure Operating Plan* references the *Sewage Management Plan* and *Operation and Maintenance Manual*, both of which provide more extensive detail of the infrastructure.

### Design and Construction:

The *Infrastructure Operating Plan*, as initially reviewed, did not specifically indicate the arrangements for design and construction of the infrastructure, although the *Sewage Management Plan* (which is referenced in the *Infrastructure Operating Plan*) indicates that the infrastructure installed as Stage 1 of the development (east of Vincents Road) was developed (designed and constructed) under approvals granted by Hawkesbury City Council pursuant to Section 68 of the *Local Government Act*.<sup>2</sup> A copy of Council's approval to install a centralised sewage treatment plant was included in Appendix 3.5.1.2 to Aquacell's Network Operator Licence Application.

The treatment plant was designed and constructed by Aquacell, which has extensive experience in the design, construction, operation and maintenance of wastewater treatment infrastructure. Copies of design drawings, including the process and instrumentation drawing (P&ID),<sup>3</sup> detailed layout drawings, electrical drawings and a 3D perspective drawing were sighted during the audit. Design criteria are identified in the *Operations and Maintenance Manual*.<sup>4</sup>

Drawings showing the sewage collection network<sup>5</sup> were sighted during the audit. A compliance certificate from Barker Ryan Stewart (a Private Subdivision Certifier) identifies the constructed works as:

*"Access road, stormwater drainage and associated works shown on plans approved by Design Compliance Certificate 20110159C01 issued by Barker Ryan Stewart and Construction Certificate No. 110310 issued*

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<sup>1</sup> *Infrastructure Operating Plan*, section 2.

<sup>2</sup> *Sewage Management Plan*, section 1.

<sup>3</sup> Aquacell, Drawing A0069-PID-01 (Rev E), Kurrajong; *Aquacell Black Water Plant 20kL/d; Process and Instrumentation Diagram*.

<sup>4</sup> *Operations and Maintenance Manual*, section 2.2.

<sup>5</sup> Harris Page and Associates, Drawings 5460/H-01, H-02 and H-03 (Rev D), Kurrajong Hamlet; *Hydraulic Services Site Plan Sheets 1, 2 and 3* (respectively).

It is noted that the compliance certificate does not specifically nominate sewerage infrastructure. Aquacell has sought to obtain further evidence from the developer (who arranged design and construction of the sewage collection network) to confirm that the sewerage infrastructure forms part of the "... associated works shown on plans ...", however, such evidence has not been provided.

The sub-surface irrigation system is divided into five (5) zones; a control panel, drawings for which were sighted during the audit,<sup>6</sup> ensures that these zones are irrigated in sequence for the nominated period of time. Design of the irrigation system was based on recommendations presented in a land capability assessment report.<sup>7</sup> The outcomes of a risk assessment, documented in the *Sewage Management Plan*,<sup>8</sup> were also taken into account.

A Development Application for design and construction of the sewage collection network to service Stage 2 of the development (west of Vincents Road) was approved by Hawkesbury City Council on 14 October 2014. The *Notice of Determination of a Development Application*<sup>9</sup> includes a requirement that:

"69. *Inspections and Compliance Certificates for sewer works can only be conducted and issued by a public authority or any person licensed under the Water Industry Competition Act.*"

This is also consistent with requirements of the *Hawkesbury Development Control Plan*<sup>10</sup> which requires that:

"Sewer mains proposed for Community Title subdivisions that do not discharge to Sydney Water or Hawkesbury City sewers must still be constructed to a standard specification. The applicant must either submit Sydney Water or Department of Land and Water Conservation approved plans with the Subdivision or Development Application or submit plans to Hawkesbury City's Wastewater Operations Branch for approval."

Although not captured in the *Infrastructure Operating Plan* (version initially reviewed), this documentation outlines the arrangements in relation to design and construction of the infrastructure to be installed as Stage 2 of the Tallowood development.

Subsequent to issue of the draft audit report, Aquacell has revised the *Infrastructure Operating Plan* to include a new section<sup>11</sup> which addresses design and construction of the infrastructure in some detail. More specifically, the new section addresses:

- History of Development – provides an overview of the arrangements in respect of design and construction of infrastructure to date.
- New Works covered under the existing Network Operator's Licence – acknowledges Aquacell's responsibilities in respect of design and construction of new works under its Network Operator's Licence.
- Design and Construction of Sewerage Networks – identified that the *Hawkesbury Development Control Plan 2002* (implemented by the Hawkesbury City Council) specifies the standards governing subdivisions and other development works within the Hawkesbury municipality.
- Design and Construction of Treatment Plant – identifies the arrangements under which the existing treatment plant was designed and constructed and indicates that further augmentation is not proposed.
- Design and Construction of Irrigation Disposal Areas – identifies the arrangements under which the existing irrigation disposal system was designed and constructed and indicates that further extension is not proposed.
- Future Developments – outlines the actions that would be implemented in the event that the existing sewerage system was to be extended to service any future development beyond the Tallowood

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<sup>6</sup> Kenrahn, Drawings TWS81-15/2 and 15/3 (Issue 001), 6 Station 240 Volt DOL Turf Watering Starter.

<sup>7</sup> Woodlots and Wetlands, *Effluent management Investigations at Vincent Road, Kurrajong (Version 2)*, 15 November 2012 [Appendix B to the *Sewage Management Plan*].

<sup>8</sup> *Sewage Management Plan*, sections 8 & 9 and appendix A.

<sup>9</sup> Hawkesbury City Council, *Notice of Determination of a Development Application* in respect of Development Application No: DA0466/14 and covering letter dated 16 October 2015.

<sup>10</sup> Hawkesbury City Council, *Hawkesbury Development Control Plan; Appendix E – Civil Works Specification*, undated, Part I, Section 9.1.3.

<sup>11</sup> *Infrastructure Operating Plan*, section 10.

In summary, the *Infrastructure Operating Plan*, as updated subsequent to issue of the draft audit report, clearly indicates the arrangements in relation to the design and construction of the infrastructure. It is further noted that the *Infrastructure Operating Plan*<sup>12</sup> also indicates the arrangements to be implemented when connections are to be made to the sewerage network.

**Operation and Maintenance:**

The *Infrastructure Operating Plan*<sup>13</sup> references the *Operations and Maintenance Manual* which includes sections that address in detail:

- Introduction – including a project overview; the scope of the manual; warnings and precautions; a contact list; and emergency protocols.
- Design Parameters – including code and authorities; design criteria; and work health and safety guidance.
- System Description – which describes the site, sewage collection network, blackwater treatment plant and irrigation disposal network.
- Blackwater Treatment Plant Operating Instructions.
- Maintenance Procedures – which address sewerage network maintenance; instrument calibrations; quantitative verification of plant parameters; observation of equipment and plant performance; membrane cleaning; service check list; irrigation system maintenance; maintenance frequency; and asset replacement.
- Trouble shooting – including identification of system alarm conditions; and general operational issues.
- Appendices – including Safe Work Method Statements (SWMS); Blackwater Treatment Plant – Major Equipment; Service Check Sheet; an Asset Replacement Schedule; and Manufacturer’s Operation Manuals.

A review of the Operation and Maintenance Manual reveals it to be extensive and well detailed.

The management of incidents and emergencies is addressed in *Sewage Management Plan*<sup>14</sup> and *Operation and Maintenance Manual*<sup>15</sup> (both of which are referenced in the *Infrastructure Operating Plan*). The *Infrastructure Operating Plan*<sup>16</sup> also nominates service providers that provide emergency pump out and repair services.

In summary, the *Infrastructure Operating Plan* adequately indicates the arrangements in relation to the operation and maintenance of the infrastructure.

**Asset Management:**

The *Infrastructure Operating Plan*<sup>17</sup> provides an overview of Aquacell’s approach to the management of the assets, including both asset maintenance and asset replacement. The asset maintenance and replacement strategies have been developed on the basis of a detailed Asset Replacement Risk Assessment which is included as an appendix to the *Infrastructure Operating Plan*.

All scheme assets are listed in the Asset Replacement Schedule which is also included as an appendix to the *Infrastructure Operating Plan*. Review of the schedule reveals that planned replacement timings are generally consistent with industry practice.

The *Infrastructure Operating Plan*<sup>18</sup> indicates that the findings of the risk assessment have led Aquacell to adopt a “run to fail” approach to the management of the assets and will implement maintenance regimes consistent with manufacturer’s recommendations. A detailed explanation of the reasoning in support of the adopted management approach has been provided; key to this approach are:

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<sup>12</sup> *Infrastructure Operating Plan*, section 11.

<sup>13</sup> *Infrastructure Operating Plan*, section 8.

<sup>14</sup> *Sewage Management Plan*, section 12.

<sup>15</sup> *Operations and Maintenance Manual*, section 1.5.

<sup>16</sup> *Infrastructure Operating Plan*, section 12.

<sup>17</sup> *Infrastructure Operating Plan*, section 5.

<sup>18</sup> *Infrastructure Operating Plan*, section 5.2.

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- the significant upstream and downstream (of the treatment plant) buffering storages;
  - the automated treatment plant shutdown arrangements in the event of asset failure;
  - the availability (largely “off the shelf”) of replacement parts; and
  - regular monitoring and inspection.

In summary, the *Infrastructure Operating Plan* appropriately describes the arrangements in relation to the life cycle management of the infrastructure assets.

#### **Site Inspection:**

A site inspection of the infrastructure, which has been in operation for approximately 18 months, was undertaken as part of the audit. Observations made during the inspection included the following:

- The above ground infrastructure was in good condition and appeared to be well maintained.
- The treatment plant (and associated equipment) was operating and the turbidity reading (0.64 NTU) indicated that it was operating effectively. It was noted that readings on both the instrument display and the SCADA display were consistent.
- Aquacell advised that the SCADA link from the site to its office was not operational at the time of audit. Whilst not deemed to be of significant operational concern (refer further discussion in Table A1.2), action was currently in hand to address this issue.
- Treated water pipework and irrigation pit covers were appropriately identified (coloured lilac) (refer Figure A3.5); however, the storage tank was not identified as containing recycled water. It may be prudent to label the tank accordingly, preferably adjacent to connections and points of access.
- There was a significant flow of groundwater from the embankment adjacent to the sewage collection/buffer tank (refer Figure A3.7). This seepage water had filled the in-ground waste sludge tank, thereby rendering it unusable unless it is pumped out prior to wasting sludge (this issue is discussed further in Table A2.2). There is also a longer term potential for the flow to compromise the stability of the embankment if effective groundwater drainage measures are not put into place.

#### **Summary:**

Whilst the *Infrastructure Operating Plan* indicates the arrangements in relation to the design, construction, operation and maintenance of the infrastructure and the lifecycle management of the assets. There are, however, some opportunities for improvement as identified below.

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### **Recommendations**

There are no recommendations in respect of this requirement.

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### **Opportunities for improvement**

It is suggested that Aquacell:

- continue to take action to ensure that operation of the SCADA link is restored as soon as possible, thereby ensuring that treatment plant performance can be monitored in accordance with the documented arrangements;
  - consider labelling the treated water tank to indicate that it contains recycled water; and
  - take action to collect and divert groundwater seepage, thereby:
    - ensuring that the waste sludge tank remains in a state of operational readiness for its intended purpose without the need for prior dewatering; and
    - eliminating potential longer term instability of the embankment from which the seepage is occurring.
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**Table A1.2 IOP Audit Table – WIC Reg Sched 1 cl.13(1)(b)**

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.13(1)(b)	The IOP indicates the arrangements in relation to the continued safe and reliable performance of the infrastructure.	Compliant
<hr/>		
Risk	Target for Full Compliance	
This presents a high operational risk. The risk is generally managed by the implementation of an asset management system/framework that outlines the basis for the ongoing management of the infrastructure assets.	Preparation of an Asset Management Plan and supporting procedural documentation and demonstrated implementation of appropriate infrastructure management practices.	
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Evidence sighted		
<ul style="list-style-type: none"><li>Interviews with Aquacell personnel.</li><li>Site inspection undertaken on 18 January 2016.</li><li>Aquacell, <i>Infrastructure Operating Plan; Blackwater Disposal Scheme; Tallowood Residential Community Development, Kurrajong NSW 2758 (Revision 3)</i>, 11 January 2016 [subsequently revised].</li><li>Aquacell, <i>Infrastructure Operating Plan; Blackwater Disposal Scheme; Tallowood Residential Community Development, Kurrajong NSW 2758 (Revision 4)</i>, 28 January 2016.</li><li>Aquacell, <i>Tallowood Residential Community Development – Kurrajong NSW; Sewage Management Plan (Revision 3)</i>, 7 January 2016.</li><li>Aquacell, <i>Kurrajong Hamlet; Tallowood Residential Estate; Operation and Maintenance Manual; Sewage Network, Water Treatment Plant, Irrigation Disposal (Revision A0069-2)</i>, 11 January 2016 [subsequently revised].</li><li>Aquacell, <i>Kurrajong Hamlet; Tallowood Residential Estate; Operation and Maintenance Manual; Sewage Network, Water Treatment Plant, Irrigation Disposal (Revision A0069-3)</i>, 28 January 2016.</li><li>Aquacell, <i>Internal Training Register</i>, 2 July 2015 update.</li><li>Aquacell, <i>External Training Register</i>, 25 June 2015 update.</li></ul>		
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Summary of reasons for grade		
<p>The <i>Infrastructure Operating Plan</i> indicates the arrangements in relation to the safe and reliable performance (operation and maintenance) of the infrastructure, with greater detail provided in the <i>Operations and Maintenance Manual</i>. Furthermore, Aquacell demonstrated through position descriptions and training records that operation and maintenance of the infrastructure is undertaken by appropriately qualified and experienced personnel.</p> <p>Accordingly, Aquacell is deemed to have demonstrated full compliance with this requirement.</p>		
<hr/>		
Discussion and notes		
<p>The continued safe and reliable performance of the infrastructure is dependent upon the implementation of effective operational, maintenance, condition monitoring and refurbishment/replacement practices. These practices are referenced in the <i>Infrastructure Operating Plan</i><sup>19</sup> and are identified and described in detail in the <i>Operations and Maintenance (O&amp;M) Manual</i>. A summary of the contents of the <i>Operations and Maintenance (O&amp;M) Manual</i>, which is considered to be extensive and well detailed, is presented in Table A1.1.</p>		

<sup>19</sup> *Infrastructure Operating Plan*, section 5.

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As also noted in Table A1.1, Aquacell has adopted a “run to fail” approach to the management of the assets and will implement maintenance regimes consistent with manufacturer’s recommendations.

The *Operations and Maintenance Manual*<sup>20</sup> indicates that maintenance is to be undertaken at monthly intervals. A Maintenance Service Checklist, which identifies the required inspection and maintenance activities, has been developed and is being implemented.

Operational monitoring and control of the treatment plant is undertaken remotely via SCADA. Data is transmitted at 5 minute intervals and reviewed on a daily basis.<sup>21</sup> Alarm conditions are notified to relevant personnel via email.<sup>22</sup>

As noted in Table A1.1, the SCADA link from the site was not operating at the time of audit. This was not, however, considered to be of significant operational concern as:

- more regular (at least weekly) site inspections are being undertaken until this fault has been repaired;<sup>23</sup>
- the treatment plant shuts down automatically if water quality limits are exceeded;
- there is ample storage capacity in the buffer tank to accommodate incoming sewage flows for a period (≈20 days) which is significantly in excess of the weekly inspection interval under current loadings;
- there is ample storage in the treated water tank to accommodate plant production for a period (≈9 days) which is significantly in excess of the weekly inspection interval under current loadings;
- the impact will be minimal in the event that a failure occurs as there is no unfenced or sensitive receiving environment immediately downstream; and
- many similar plants of this scale don’t have daily checks being made and are run entirely automatically.

Effective performance of infrastructure is in part dependent upon the resources engaged to undertake operation and maintenance activities. Personnel involved in operation and maintenance of the infrastructure include the Technical Manager, Project Manager, Service Technicians and Operations Engineer, the roles and responsibilities of which were described in Appendix 6.1.3.1 to Aquacell’s Network Operator Licence Application together with skill and experience requirements.

Operation and maintenance activities are undertaken principally by one of two nominated Service Technicians. Records of both internal<sup>24</sup> and external<sup>25</sup> training undertaken by these and other Aquacell personnel were sighted during the audit; training was relevant to the operation and maintenance of the infrastructure.

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## Recommendations

There are no recommendations in respect of this requirement.

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## Opportunities for improvement

No opportunities for improvement are identified in respect of this requirement.

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<sup>20</sup> *Operations and Maintenance Manual*, section 5.9.

<sup>21</sup> *Infrastructure Operating Plan*, section 5.2.

<sup>22</sup> Personal comment during audit interviews and site inspection on 18 January 2016.

<sup>23</sup> Personal comment during audit interviews and site inspection on 18 January 2016.

<sup>24</sup> Aquacell, *Internal Training Register*, 2 July 2015 update.

<sup>25</sup> Aquacell, *External Training Register*, 25 June 2015 update.

**Table A1.3 IOP Audit Table – WIC Reg Sched 1 cl.13(1)(c)**

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.13(1)(c)	The IOP indicates the arrangements in relation to the continuity of sewerage services.	Compliant
<hr/>		
Risk	Target for Full Compliance	
This presents a high operational risk. The risk is generally managed by operating in accordance with agreed protocols for both planned and unplanned service interruptions.	Development and implementation of appropriate protocols for both unplanned and planned service interruptions.	
<hr/>		
Evidence sighted		
<ul style="list-style-type: none"><li>Interviews with Aquacell personnel.</li><li>Site inspection undertaken on 18 January 2016.</li><li>Aquacell, <i>Infrastructure Operating Plan; Blackwater Disposal Scheme; Tallowood Residential Community Development, Kurrajong NSW 2758 (Revision 3)</i>, 11 January 2016 [subsequently revised].</li><li>Aquacell, <i>Infrastructure Operating Plan; Blackwater Disposal Scheme; Tallowood Residential Community Development, Kurrajong NSW 2758 (Revision 4)</i>, 28 January 2016.</li><li>Aquacell, <i>Tallowood Residential Community Development – Kurrajong NSW; Sewage Management Plan (Revision 3)</i>, 7 January 2016.</li><li>Aquacell, <i>Kurrajong Hamlet; Tallowood Residential Estate; Operation and Maintenance Manual; Sewage Network, Water Treatment Plant, Irrigation Disposal (Revision A0069-2)</i>, 11 January 2016 [subsequently revised].</li><li>Aquacell, <i>Kurrajong Hamlet; Tallowood Residential Estate; Operation and Maintenance Manual; Sewage Network, Water Treatment Plant, Irrigation Disposal (Revision A0069-3)</i>, 28 January 2016.</li><li>Aquacell, <i>Retail Supply Management Plan (Draft)</i>, 3 August 2011.</li></ul>		
<hr/>		
Summary of reasons for grade		
<p>Aquacell has arrangements in place for ensuring (as far as practical) the continuity of sewerage services; these arrangements are documented in the <i>Infrastructure Operating Plan</i> and <i>Operations and Maintenance Manual</i>. It is, however, noted that maintenance of services in the event of a blockage or break within the sewage collection network is dependent upon early identification (principally through resident notification) and rapid repair by the Licensee; this is consistent with typical industry arrangements.</p> <p>Accordingly, it is assessed that Aquacell is compliant with this requirement.</p>		
<hr/>		
Discussion and notes		
<p>The continuity of sewerage services is dependent in the first instance upon the effective operation and maintenance of the infrastructure. As discussed in Table A1.2, the <i>Infrastructure Operating Plan</i> indicates the arrangements in relation to the safe and reliable performance (operation and maintenance) of the infrastructure.</p> <p>The <i>Infrastructure Operating Plan</i> also identifies that:<sup>26</sup></p> <p><i>“There is significant buffer tank capacity at the head of the works to cover short term plant interruptions. The buffer tank has 100kL capacity and the calculated demand at full development is 12kL. The buffer</i></p>		

<sup>26</sup> *Infrastructure Operating Plan*, section 5.2.



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*tank represents 8 days of storage capacity for incoming sewage."*

The provision of this buffer storage ensures the continuity of sewerage services during periods that the treatment plant may be unavailable or removed from service.

Effective maintenance and inspection procedures ensure (as far as possible) that the sewage collection system remains operational; however, consistent with other utilities, Aquacell is reliant on residents reporting any indication of sewer blockages or breaks. Such reliance is documented in the Incidents and Emergencies section of the *Operations and Maintenance Manual*.<sup>27</sup> It is also reflected in the Service Agreement between Aquacell and the Tallowood Community Association,<sup>28</sup> which indicates that the Client has responsibility to: "*Inform the Licensee as soon as practical of any network failure*".

As noted in Table A1.1, the *Infrastructure Operating Plan*<sup>29</sup> nominates service providers that provide emergency pump out services. Pump out services can be used to pump out either the buffer tank or the treated water tank in the event that the capacity of either storage is exceeded. Pump out services can also be used to extract sewage flows directly from the collection sewers if the need arises.

The Retail Supply Management Plan<sup>30</sup> identifies continuity of supply and preventative measures that are in place, however, these relate the supply of treated water.

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### **Recommendations**

There are no recommendations in respect of this requirement.

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### **Opportunities for improvement**

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

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<sup>27</sup> *Operations and Maintenance Manual*, section 1.5.1.

<sup>28</sup> *Service Agreement; Lot 1, 21 Vincents Road, Kurrajong, NSW* between Aquacell, Bencorp Property Developments, Sage Property Holdings and the Tallowood Community Association (sighted copy undated), table 3.1.

<sup>29</sup> *Infrastructure Operating Plan*, section 11.

<sup>30</sup> Aquacell, *Retail Supply Management Plan (Draft)*, 3 August 2011.

**Table A1.4 IOP Audit Table – WIC Reg Sched 1 cl.13(1)(d)**

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.13(1)(d)	The IOP indicates the arrangements in relation to alternative sewerage services when the infrastructure is inoperable.	Compliant
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Risk	Target for Full Compliance	
This presents a high operational risk. The risk is generally managed by operating in accordance with agreed protocols for both planned and unplanned service interruptions.	Development and implementation of appropriate protocols for both unplanned and planned service interruptions.	
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Evidence sighted		
<ul style="list-style-type: none"><li>Interviews with Aquacell personnel.</li><li>Site inspection undertaken on 18 January 2016.</li><li>Aquacell, <i>Infrastructure Operating Plan; Blackwater Disposal Scheme; Tallowood Residential Community Development, Kurrajong NSW 2758 (Revision 3)</i>, 11 January 2016 [subsequently revised].</li><li>Aquacell, <i>Infrastructure Operating Plan; Blackwater Disposal Scheme; Tallowood Residential Community Development, Kurrajong NSW 2758 (Revision 4)</i>, 28 January 2016.</li><li>Aquacell, <i>Tallowood Residential Community Development – Kurrajong NSW; Sewage Management Plan (Revision 3)</i>, 7 January 2016.</li><li>Aquacell, <i>Kurrajong Hamlet; Tallowood Residential Estate; Operation and Maintenance Manual; Sewage Network, Water Treatment Plant, Irrigation Disposal (Revision A0069-2)</i>, 11 January 2016 [subsequently revised].</li><li>Aquacell, <i>Kurrajong Hamlet; Tallowood Residential Estate; Operation and Maintenance Manual; Sewage Network, Water Treatment Plant, Irrigation Disposal (Revision A0069-3)</i>, 28 January 2016.</li></ul>		
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Summary of reasons for grade		
Aquacell has documented its arrangements for the provision of alternative sewerage services when the infrastructure is inoperable in the <i>Infrastructure Operating Plan</i> and/or <i>Operations and Maintenance Manual</i> . Accordingly, it is assessed that Aquacell is compliant with this requirement.		
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Discussion and notes		
The sewerage services may be subject to either planned or unplanned interruptions, which may render the infrastructure inoperable. This is consistent with the servicing provisions provided the broader community.		
Arrangements that can be implemented in the event that infrastructure is inoperable are as discussed in Table A1.3 in respect of the continuity of services. In summary, these alternative arrangements are as follows:		
<ul style="list-style-type: none"><li>Sewage collection network – as is typically the case with sewage collection systems, the maintenance of service is largely dependent upon rapid identification and repair of sewer blockages or breaks. Whilst Aquacell’s maintenance procedures include regular inspection of the network, it is principally dependent upon residents to notify it in the event that the sewers are inoperable. Alternative servicing arrangements include the use of pump out services.</li><li>Treatment Plant –use of the buffer storage and, if the capacity is exceeded, pump out services to dispose of accumulated sewage.</li><li>Irrigation System – use of the storage capacity provided by the treated water tank and use of pump out</li></ul>		

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services if the tank becomes full.

As noted in Table A1.3, these arrangements are documented in the *Infrastructure Operating Plan* and/or the *Operations and Maintenance Manual*.

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### **Recommendations**

There are no recommendations in respect of this requirement.

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### **Opportunities for improvement**

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

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**Table A1.5 IOP Audit Table – WIC Reg Sched 1 cl.13(1)(e)**

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.13(1)(e)	The IOP indicates the arrangements in relation to the maintenance, monitoring and reporting of standards of service.	Compliant

Risk	Target for Full Compliance
This presents a medium operational risk in that the Licensee may be unaware that standards of service are not being met in the absence of performance monitoring.	Implementation of appropriate systems to monitor the service delivery performance of the infrastructure.

**Evidence sighted**

- Interviews with Aquacell personnel.
- Site inspection undertaken on 18 January 2016.
- Aquacell, *Infrastructure Operating Plan; Blackwater Disposal Scheme; Tallowood Residential Community Development, Kurrajong NSW 2758 (Revision 3)*, 11 January 2016 [subsequently revised].
- Aquacell, *Infrastructure Operating Plan; Blackwater Disposal Scheme; Tallowood Residential Community Development, Kurrajong NSW 2758 (Revision 4)*, 28 January 2016.
- Aquacell, *Tallowood Residential Community Development – Kurrajong NSW; Sewage Management Plan (Revision 3)*, 7 January 2016.
- Aquacell, *Kurrajong Hamlet; Tallowood Residential Estate; Operation and Maintenance Manual; Sewage Network, Water Treatment Plant, Irrigation Disposal (Revision A0069-2)*, 11 January 2016 [subsequently revised].
- Aquacell, *Kurrajong Hamlet; Tallowood Residential Estate; Operation and Maintenance Manual; Sewage Network, Water Treatment Plant, Irrigation Disposal (Revision A0069-3)*, 28 January 2016.
- Aquacell, *Monthly Report Aquacell Recycled Water Plant; Kurrajong Hamlet, Kurrajong NSW 2753*, 10 November 2015.
- Aquacell, *Complaints Handling and Dispute Resolution Policy (Revision 3.5)*, 5 December 2011.

**Summary of reasons for grade**

The *Infrastructure Operating Plan* indicates the arrangements in relation to the maintenance, monitoring and reporting of standards of service, with additional detail documented in the *Sewage Management Plan* and *Operations and Maintenance Manual*.

Maintenance of standards of service is also reliant on customer complaints to identify any failure to meet the specified standards; this is consistent with practices adopted by other water utilities.

Accordingly, Aquacell is assessed as being compliant with this requirement.

**Discussion and notes**

**Levels of Service:**

The *Infrastructure Operating Plan* indicates that:<sup>31</sup>

“Plant performance standards and levels of service are measures against two key indicators:

- Quality – the delivered water quality set out in the current revision of the *Sewage Management Plan*

<sup>31</sup> *Infrastructure Operating Plan*, section 4.

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- *Quantity – the volume agreed and documented with the end user. Where the user does not specify a quantity, the plants rated capacity is the upper limiting Quantity."*

As identified in the *Sewage Management Plan*,<sup>32</sup> target treated water quality is defined as follows:

- *E. coli* <1,000cfu/100mL;
- BOD <20mg/L;
- Suspended Solids <30mg/L; and
- Turbidity <5NTU.

The design capacity of the treatment plant is 20kL/day,<sup>33</sup> although the *Sewage Management Plan* indicates that when the residential community is fully populated, 12.2kL/day of wastewater will be produced.<sup>34</sup>

### **Monitoring and Reporting:**

In respect of the monitoring and reporting of standards of service, the *Infrastructure Operating Plan* indicates that:<sup>35</sup>

*"Plant performance is monitored as follows:*

- *Quality – critical control points ensure that product which does not meet the required treated water quality is not transferred for irrigation. Out of specification water would be removed for offsite disposal*
- *Quantity – flowmeters record the total treated water and this volume is reported in a monthly report to the customer."*

*The end user is supplied with a monthly report which summarises the plants performance during the month. It includes:*

- *Volume of treated water supplied;*
- *Summary of activities which have been undertaken on the plant during the reporting period*
- *Significant upcoming work which may need to be undertaken."*

The *Infrastructure Operating Plan* refers generally to the *Sewage Management Plan* and the *Operations and Maintenance Manual*, both of which outline the approach to monitoring of performance standards and standards of service. The *Sewage Management Plan*<sup>36</sup> outlines the requirements for both initial validation monitoring and ongoing monitoring of treatment plant performance; it identifies specific parameters to be monitored and their monitoring frequency. The *Operations and Maintenance Manual*<sup>37</sup> provides a more detailed description of the arrangements for online (via SCADA) monitoring and control of the treatment plant.

In respect of ongoing monitoring,<sup>38</sup> it is noted that turbidity, which is to be maintained at or below 5NTU, is the sole critical control point for the treatment plant; this is logged every 5 minutes. An alert is raised if turbidity exceeds 2NTU, thereby providing advance warning of a potential problem and the plant will shut down and stop delivering water to the treated water tank if turbidity exceeds 5NTU. Treated water *E. coli* levels are to be tested at least quarterly.

Aquacell provided a copy of the monthly performance report for October 2015.<sup>39</sup> Review of the report confirmed that it is consistent with the reporting requirements outlined in the *Infrastructure Operating Plan* (see above).

### **Customer Complaints:**

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It is noted that, in addition to the identified monitoring, Aquacell is also reliant upon customer complaints to

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<sup>32</sup> *Sewage Management Plan*, table 11.1.

<sup>33</sup> *Infrastructure Operating Plan*, section 2.

<sup>34</sup> *Sewage Management Plan*, section 6.2.2.

<sup>35</sup> *Infrastructure Operating Plan*, section 4.

<sup>36</sup> *Sewage Management Plan*, section 11.

<sup>37</sup> *Operations and Maintenance Manual*, section 4.

<sup>38</sup> *Sewage Management Plan*, section 11.1.3.

<sup>39</sup> Aquacell, *Monthly Report Aquacell Recycled Water Plant; Kurrajong Hamlet, Kurrajong NSW 2753*, 10 November 2015.

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identify any failure to meet performance standards.<sup>40</sup> The *Complaints Handling and Dispute Resolution Policy*,<sup>41</sup> which includes the procedure as an attachment was sighted during the interviews.

Such reliance on customer complaints is consistent with practices adopted by other water utilities.

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### **Recommendations**

There are no recommendations in respect of this requirement.

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### **Opportunities for improvement**

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

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<sup>40</sup> *Sewage Management Plan*, section 11.2.

<sup>41</sup> Aquacell, *Complaints Handling and Dispute Resolution Policy (Revision 3.5)*, 5 December 2011.

## Appendix 2 Detailed Audit Findings – Sewerage Management Plan (SMP)

**Table A2.1 SMP Audit Table – WIC Sched 1 cl.14(1)(a)**

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.14(1)(a)	The Sewage Management Plan indicates the manner in which the health and ecological assessments will be undertaken and any concerns arising from any such assessment addressed.	Compliant
<hr/>		
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.	
<hr/>		
Evidence sighted		
<ul style="list-style-type: none"><li>Interviews with Aquacell personnel.</li><li>Site inspection undertaken on 18 January 2016.</li><li>Aquacell, <i>Infrastructure Operating Plan; Blackwater Disposal Scheme; Tallowood Residential Community Development, Kurrajong NSW 2758 (Revision 3)</i>, 11 January 2016 [subsequently revised].</li><li>Aquacell, <i>Infrastructure Operating Plan; Blackwater Disposal Scheme; Tallowood Residential Community Development, Kurrajong NSW 2758 (Revision 4)</i>, 28 January 2016.</li><li>Aquacell, <i>Tallowood Residential Community Development – Kurrajong NSW; Sewage Management Plan (Revision 3)</i>, 7 January 2016.</li><li>Aquacell, <i>Kurrajong Hamlet; Tallowood Residential Estate; Operation and Maintenance Manual; Sewage Network, Water Treatment Plant, Irrigation Disposal (Revision A0069-2)</i>, 11 January 2016 [subsequently revised].</li><li>Aquacell, <i>Kurrajong Hamlet; Tallowood Residential Estate; Operation and Maintenance Manual; Sewage Network, Water Treatment Plant, Irrigation Disposal (Revision A0069-3)</i>, 28 January 2016.</li><li>Woodlots and Wetlands, <i>Effluent management Investigations at Vincent Road, Kurrajong (Version 2)</i>, 15 November 2012 [Appendix B to the <i>Sewage Management Plan</i>].</li><li>Aquacell, <i>External Training Register</i>, 25 June 2015.</li><li>Aquacell, <i>Internal Training Register</i>, 2 July 2015.</li><li>Aquacell, <i>Complaints Handling and Dispute Resolution Policy (Revision 3.5)</i>, 5 December 2011.</li><li>Aquacell, <i>Monthly Report Aquacell Recycled Water Plant; Kurrajong Hamlet, Kurrajong NSW 2753</i>, 10 November 2015.</li><li><i>Service Agreement; Lot 1, 21 Vincents Road, Kurrajong, NSW</i> between Aquacell, Bencorp Property Developments, Sage Property Holdings and the Tallowood Community Association (sighted copy undated).</li></ul>		
<hr/>		
Summary of reasons for grade		
<p>The <i>Sewage Management Plan</i> includes a hazard identification and risk assessment that was undertaken in accordance with guidance provided in the <i>Australian Guidelines for Water Recycling</i>. Furthermore, it was able to demonstrate that appropriate in-house representatives had participated in the risk assessment.</p> <p>Accordingly, it was assessed that Aquacell had demonstrated compliance with this requirement.</p>		
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Discussion and notes		



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**System Description:**

The *Sewage Management Plan* is comprehensive; it includes an overview of the system,<sup>42</sup> a process flow diagram<sup>43</sup> and an explanation of the uses of the effluent.<sup>44</sup>

**Risk Assessment:**

The *Sewage Management Plan* summarises the identified health<sup>45</sup> and environmental<sup>46</sup> risks and the approach to management of those risks. Both HACCP and HAZOP assessments have been undertaken with the fully detailed records appended to the *Sewage Management Plan*.<sup>47</sup>

The approach to the HACCP and HAZOP risk assessments is compliant with good practice and is the same methodology that Aquacell has used in support of its other Licence Plans (noting that these other licence plans were assessed to be compliant in this respect). Justin Taylor and Warren Johnson undertook the risk assessments directly based on risk assessments undertaken for Aquacell recycled water schemes. The filtration plant is identified as a critical control point.

**Environmental Assessment:**

A detailed *Land Capability Assessment*<sup>48</sup> has been conducted for the scheme. This assessment provides good evidence that irrigation at the site will be sustainable and that the disposal field is adequate. The irrigation system has been supplied by Kenrahn, a specialist irrigation system supplier. Long term there may be issues with failure of the irrigation system leading to local pooling or other complications so during future audits evidence of maintenance of the irrigation system should be examined.

**Operational Monitoring:**

The treatment plant is monitored on-line for dissolved oxygen, pH and turbidity. Turbidity has been adopted as the primary specification for service and risk management for the treatment plant, and has been nominated as the sole critical control point. The critical limit, which triggers automatic cessation of irrigation, is 5NTU whilst an alert limit is set at 2NTU to provide early warning of unusual results.

The plant reports data to SCADA every five minutes and provides a record of data and sends alarms of exceedances. In relation to storage tank levels, there is a high-level alarm that triggers relatively low to give notification with several days of storage before overflow occurs. Both a transducer and a float switch are used to separately trigger alarms and the levels are checked remotely approximately twice daily as part of the monitoring regime implemented by the operators.

The irrigation system is controlled via timers that progressively distribute water across five irrigation zones.

**Corrective Actions:**

The site has several days' storage in the raw sewage storage tank on the site and so initially the corrective action in response to exceedances is to stop treating water and to send an alarm. If the problem could not be rectified within several days, pump out would take place; the *Infrastructure Operating Plan*<sup>49</sup> explicitly deals with emergency pump outs and repairs and names both local and larger contractors (three in each case) that could be sourced during such an event. For this scale of system it wouldn't be hard to find such contractors within a few days' notice so this approach is adequate.

**Verification Monitoring:**

The effluent quality targets are set out in the *Sewage Management Plan*<sup>50</sup> and these match standard effluent quality as described in, for instance, table 3.8 of the *Australian Guidelines for Recycled Water* (1,000 *E. coli* per 100ml; BOD/SS 20/30mg/L; and turbidity 5NTU). *E. coli* testing is undertaken quarterly over the long term following the initial short-term intensive verification period that is often used as part of overall scheme

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<sup>42</sup> *Sewage Management Plan*, section 6.

<sup>43</sup> *Sewage Management Plan*, figure 6.1.

<sup>44</sup> *Sewage Management Plan*, section 7.

<sup>45</sup> *Sewage Management Plan*, section 8.

<sup>46</sup> *Sewage Management Plan*, section 9.

<sup>47</sup> *Sewage Management Plan*, appendix A.

<sup>48</sup> Woodlots and Wetlands, *Effluent management Investigations at Vincent Road, Kurrajong (Version 2)*, 15 November 2012 [Appendix B to the *Sewage Management Plan*].

<sup>49</sup> *Infrastructure Operating Plan*, section 11.

<sup>50</sup> *Sewage Management Plan*, table 11.1.

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validation in recycled water schemes in NSW.

### **Training and Qualifications:**

Aquacell has a systematic approach to managing its training using training registers. The *External Training Register*<sup>51</sup> covers third party training and certifications whilst the Internal Training Register<sup>52</sup> covers activities such as instrument calibration as well as operations and maintenance activities relating to the membrane. Simon Coobula and Belinda Layson are nominated as the key system operators.

### **Accountability:**

Responsibility for environmental management of the scheme appears to be adequately defined. Under a *Service Agreement*,<sup>53</sup> the Tallowood Community Association (TCA) owns the assets and is the interfacing party with Aquacell, whilst Aquacell has responsibility to operate and maintain the assets; these responsibilities are also reflected in the *Sewage Management Plan*.<sup>54</sup>

Costs for pipe breakage and blockage in the network and the concrete buffer tanker are not covered under the *Service Agreement* and would be funded as extras. Meanwhile, Aquacell is responsible for the plant and the irrigation field assets, both financially and practically. The *Service Agreement* documents explicit inclusions and exclusions for renewal, repair and servicing as well as roles and responsibilities. The IPART obligations are passed through via the *Service Agreement*. Exclusions to service include the major civil assets that are not part of the scheme.

### **Incident Response:**

A standard Incident Report Form<sup>55</sup> has been prepared to enable Aquacell to provide notification of incidents that need follow up. Recognised incidents include odour, overflow and spill. It is important that Aquacell fulfils its duty to notify “relevant authorities” (i.e. the EPA, local authority, Ministry of Health, WorkCover Authority and Fire and Rescue NSW) of pollution incidents where material harm to the environment is caused or threatened, as specified in section 148(8) of the *Protection of the Environment Operations Act 1997 (POEO Act)*.

It is hard to foresee an event arising that would lead to the need to notify NSW Health for this scheme; however, it is not clear in NSW what level of sewer spill the EPA would request to be notified under the *POEO Act*. Therefore, it is recommended that Aquacell check with EPA what the ‘material harm’ trigger level should be for sewer spills for this site.

Noise is not mentioned as a trigger in the incident response system as this is covered in the complaints handling system (see next paragraph).

### **Complaints Handling:**

It was noted that the presence of any flies, odour or noise may be blamed on the sewage treatment system and so an adequate complaints response and investigation process is warranted. A *Complaints Handling and Dispute Resolution Policy*<sup>56</sup> has been developed, of which Attachment B provides detail of the Complaints Handling Procedures. This appears to be adequate.

### **Documentation:**

The principal document of relevance to routine management of risk other than the *Sewage Management Plan* is the *Operations and Maintenance Manual (O&M) Manual*.<sup>57</sup> The document references the current versions of the *Australian Guidelines for Water Recycling 2006* and *AS/NZS 3500 Plumbing and Drainage Code*<sup>58</sup> as the relevant codes and standards.<sup>59</sup>

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<sup>51</sup> Aquacell, *External Training Register*, 25 June 2015.

<sup>52</sup> Aquacell, *Internal Training Register*, 2 July 2015.

<sup>53</sup> *Service Agreement; Lot 1, 21 Vincents Road, Kurrajong, NSW* between Aquacell, Bencorp Property Developments, Sage Property Holdings and the Tallowood Community Association (sighted copy undated).

<sup>54</sup> *Sewage Management Plan*, section 5 and table 1.

<sup>55</sup> *Sewage Management Plan*, appendix C.

<sup>56</sup> Aquacell, *Complaints Handling and Dispute Resolution Policy (Revision 3)*, 5 December 2011.

<sup>57</sup> Aquacell, *Kurrajong Hamlet Tallowood Residential Estate O&M Manual*.

<sup>58</sup> *Operations and Maintenance Manual*, section 2.1.

<sup>59</sup> The Operations and Maintenance Manual was updated to reflect the correct versions subsequent to issue of the draft audit report.

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The *Operations and Maintenance Manual* is very detailed and has retained original vendor Operations Manuals, Material Safety Data Sheets and Safe Work Methods Statements as appendices. These appendices are helpfully cited by including a table to reference specific manuals mapped to the relevant assets. The *Maintenance Service Checklist*<sup>60</sup> includes checks for odour and checks of the irrigation area (by walking it).

#### **Document Review:**

There is no programmed review process for the Licence Plans. Rather, Aquacell has been using the IPART review and audit process as a trigger for its review and update process. It is recommended that some back up trigger be set up to ensure review and update occurs after a reasonable timeframe, even in the absence of an IPART audit.

#### **Preventive Maintenance:**

Following a risk assessment, a 'run-to-fail' asset replacement strategy has been adopted. The service agreement was set up in line with Aquacell estimates of asset life to estimate what failures may occur and estimate costs with sufficient accuracy.

The site is checked monthly with the completed *Maintenance Service Checklists* being retained in hard copy format at Aquacell's Crows Nest office. Relevant details are captured in monthly reports to the customer (Tallowood Community Association). The Monthly Report for October 2015,<sup>61</sup> which detailed maintenance and service overview observations, was sighted as an example.

Inspection activities include instrument calibration and cleaning of the feed pH, dissolved oxygen, turbidity and effluent pH instruments as well as checking other assets visually. A Computerised Maintenance Management System (CMMS) is under development (to be built into Ostendo) whereby it is intended that routine preventive servicing (such as lubricating) will be carried out in accordance with manufacturer's recommendations.

#### **Site Inspection:**

During the site inspection the 18-month old treatment plant appeared to be in good condition (Figure A3.1). The treatment plant was operating during the inspection. The noise arising from the treatment plant was low; approximately the level of background along with wind, wildlife and traffic from the nearby road. This was considered adequate although it may be just audible from the nearest dwelling through an open window. No odour was detected arising from the treatment plant and the produced water ran visibly very clear with no odour.

The whole site has a very strong grade, a very large irrigation area and extensive vegetated buffers downslope of the irrigation area with an estimated 50 metres to the nearest waterway (Figure A3.2).

The treatment plant on-line monitoring was operating appropriately during the site inspection. The instruments had been protected under cover which is a good initiative (Figure A3.3). The SCADA mimic was seen at the site and the instruments were displaying on both the SCADA and their own readouts (Figure A3.4). The turbidity reading was recording 0.64 on the SCADA display and on the instrument display, suggesting that the SCADA system had been scaled precisely. During the audit the line from the SCADA to head office was down and this needs to be rectified (refer also to discussion in Table A1.1).

The irrigation assets that could be seen appeared to be in good condition and were appropriately coloured in lilac (Figure A3.5).

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#### **Recommendations**

There are no recommendations in respect of this requirement.

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<sup>60</sup> *Operations and Maintenance Manual*, section 7.3.

<sup>61</sup> Aquacell, *Monthly Report Aquacell Recycled Water Plant; Kurrajong Hamlet, Kurrajong NSW 2753*, 10 November 2015.

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### **Opportunities for improvement**

It is suggested that Aquacell:

- Consult with the EPA to determine what the “material harm” trigger level should be for notification of sewer spills at this site.
  - Implements a process to trigger review of its Licence Plans at regular pre-determined intervals.
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**Table A2.2 SMP Audit Table – WIC Sched 1 cl.14(1)(b)**

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.14(1)(b)	The Sewage Management Plan indicates the arrangements for the disposal of waste from the infrastructure.	Compliant
<hr/>		
Risk	Target for Full Compliance	
Failure to adequately make arrangements for the disposal of waste from the infrastructure presents a risk to public health and the environment.	Adequate arrangements for the disposal of waste from the infrastructure.	
<hr/>		
Evidence sighted		
<ul style="list-style-type: none"><li>Interviews with Aquacell personnel.</li><li>Site inspection undertaken on 18 January 2016.</li><li>Aquacell, <i>Tallowood Residential Community Development – Kurrajong NSW; Sewage Management Plan (Revision 3)</i>, 7 January 2016.</li><li>Aquacell, <i>Kurrajong Hamlet; Tallowood Residential Estate; Operation and Maintenance Manual; Sewage Network, Water Treatment Plant, Irrigation Disposal (Revision A0069-3)</i>, 28 January 2016.</li></ul>		
<hr/>		
Summary of reasons for grade		
<p>The <i>Sewage Management Plan</i> (SMP) documents the arrangements for the disposal of waste from the infrastructure; however, one component of the waste management facilities (the in-ground waste sludge storage tank) has its operational readiness compromised by ingress from seepage. Aquacell has updated its <i>Operations and Maintenance Manual</i> to describe how the in-ground waste sludge storage tank can be emptied if required, and given that the plant operation does not currently require the wasting of sludge and the tank can be dewatered with minimal advance notice, this is not currently considered a non-compliance. However, an opportunity for improvement relating to this item is raised under Clause WIC Reg Sched 1 cl.13(1)(a), above.</p>		
<hr/>		
Discussion and notes		
<p>The screenings are collected in a skip and go to general rubbish as per general community waste. During the site inspection this asset appeared intact (Figure A3.6).</p> <p>Wasted sludge is collected in a waste sludge tank before disposal as septic waste. During the site inspection, groundwater was seen flowing from the embankment as a slow above ground discharge (Figure A3.7). This water is flowing into the in-ground waste sludge tank, thereby rendering it potentially incapable for use for its intended purpose as waste sludge storage facility without dewatering.</p> <p>Whilst at this stage there is no requirement for sludge wastage (the MLLS is currently less than 8,500 mg/L) and the tank could be dewatered if its use is required, it is prudent that this issue is addressed to ensure the long term effective operation of the treatment facility.</p> <p>Notwithstanding, subsequent to issue of the draft audit report, Aquacell has updated the <i>Operations and Maintenance Manual</i><sup>62</sup> to include arrangements in respect of sludge wasting and emptying of the sludge tank which had not previously been documented. These arrangements include ensuring that there is sufficient space in the sludge tank prior to sludge wasting and acknowledgment that the sludge tank also captures drainage water. However, an opportunity for improvement relating to this item is raised under Clause WIC Reg Sched 1 cl.13(1)(a), above.</p>		

<sup>62</sup> New sections 5.7 and 5.8 added to the *Operations and Maintenance Manual*; subsequent sections 5.9 to 5.12 re-numbered.

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**Recommendations**

There are no recommendations in respect of this requirement.

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**Opportunities for improvement**

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

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## Appendix 3      Site Photographs



**Figure A3.1    Overview of treatment plant**





**Figure A3.2 Overview of site**



**Figure A3.3 Cover over on-line monitoring instruments**



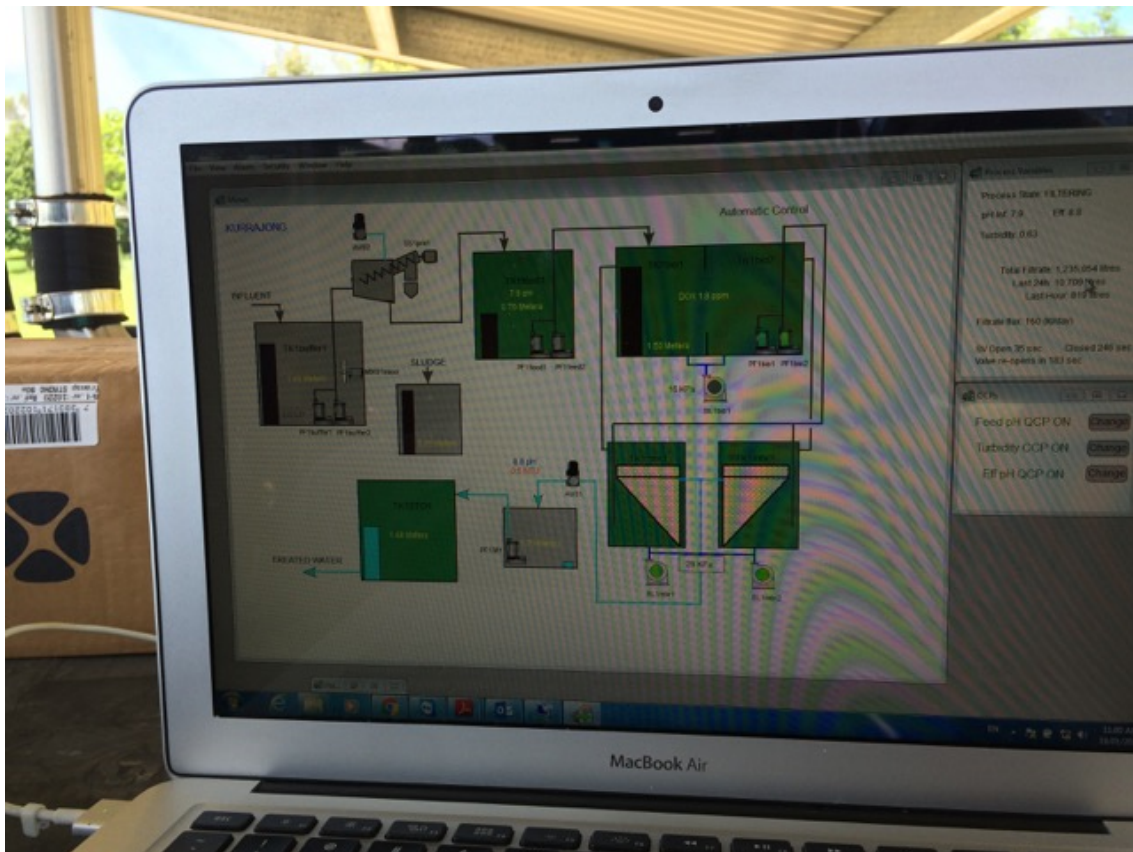


Figure A3.4 SCADA mimic



Figure A3.5 Examples of lilac assets





**Figure A3.6 Screenings disposal system**



**Figure A3.7 Groundwater seepage that overwhelms the waste sludge storage pit**