

WICA Audit Report to IPART

Licence Plan Audit
(Recycled Water Scheme – Stormwater Harvesting and
Treatment)

Green Square Water

Independent Pricing and Regulatory Tribunal
Water Industry Competition Act 2006

Network Operator's Licence Audit Report

Licence No. 15_031: Green Square Water Pty Ltd
(also known as Green Square Water)

Licence Holder: Green Square Water Pty Ltd (ACN 163 432 906)

Document Version 5 (Updated Final Report), prepared 11 February 2018



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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 this audit was the infrastructure to be operated under Network Operator's Licence No. 15_031 for the supply of non-potable (recycled) water to Stages 1 and 2 of the Green Square Town Centre development; i.e. the Area of Operations as defined in the Licence. The Licence Holder is Green Square Water Pty Ltd (ACN 163 432 906).

The scope of the audit was a 'Licence Plan audit' of the management plans required under the Licence as they relate to the non-potable (recycled) water infrastructure. The audit was specifically focussed on the stormwater harvesting and treatment components of the scheme; the distribution/reticulation components were the subject of a previous audit.

The Licence Plans subjected to audit were as follows:

- *Infrastructure Operating Plan (IOP)*; and
- *Water Quality Plan (non-potable water) (WQP (npw))*.

A 'New Infrastructure audit', which is reported separately, was also conducted in respect of the stormwater harvesting and treatment infrastructure.

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 (Green Square Water Pty Ltd) was found to have documented the arrangements in relation to the design, construction, operation and maintenance of the proposed recycled water scheme in full compliance with the assessed audit criteria. One opportunity for improvement was identified.

In the opinion of the auditors, Green Square Water's management plans (*Infrastructure Operating Plan* and *Water Quality Plan (non-potable water)*, in conjunction with the *Green Square Water Scheme Management Plan*) adequately document the arrangements in relation to the design, construction, operation and maintenance of the proposed stormwater harvesting and treatment infrastructure that is to be operated under Network Operator's Licence No: 15_031. The documented arrangements are adequately compliant with the relevant guidelines, standards and legislative 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 this audit was the infrastructure to be operated under Network Operator's Licence No. 15_031 for the supply of non-potable (recycled) water to Stages 1 and 2 of the Green Square Town Centre development; i.e. the Area of Operations as defined in the Licence. The Licence Holder is Green Square Water Pty Ltd (ACN 163 432 906) (Green Square Water/GSW).

The scope of the audit was a 'Licence Plan Audit' of the management plans required under the Licence as they relate to the non-potable (recycled) water infrastructure. The audit was specifically focussed on the stormwater harvesting and treatment components of the scheme; the distribution/reticulation components were the subject of a previous audit.¹

A 'New Infrastructure Audit', which is reported separately, was also conducted in respect of the stormwater harvesting and treatment infrastructure.

2.2 Licensee's infrastructure, systems and procedures

The Licence Holder's infrastructure, systems and procedures audited were those related to the Green Square Water scheme (the Scheme) (refer <http://greensquarewater.com.au/>).

The infrastructure will comprise non-potable (recycled) water infrastructure to service the Green Square development, including:

- stormwater harvesting infrastructure comprising offtake structure, sedimentation pit, screening chamber, gross pollutant trap (GPT), pumping station and rising main to a treatment plant;
- a recycled water treatment plant (Local Water Centre); and
- a recycled water distribution/reticulation system.

At the time of the audit, components of the distribution/reticulation system had already been brought into commercial operation. The stormwater harvesting and treatment infrastructure (which were the subject of this audit) have been designed and constructed to meet the ultimate required capacity of 900k L/day.

Green Square Water is the Licence Holder, holding Network Operator's Licence No.15_031. Green Square Water is responsible for the operation and maintenance of the Green Square town Centre non-potable water supply system. Flow Systems Pty Ltd (Flow) (ACN 136 272 298) and the City of Sydney Council (ACN 636 550 790) are named as 'Authorised Persons' under this Licence.

As Licensee, Green Square Water will be responsible for the ongoing operation and maintenance of the infrastructure in accordance with its Licence Plans including:

- Scheme Management Plan (Scheme MP) – Green Square Water, *Scheme Management Plan (Scheme MP) (Revision 4)*, 29 January 2018;²

which must be read in conjunction with:

- Infrastructure Operating Plan – Flow, *Infrastructure Operating Plan (IOP) (Revision 8)*, 21 December 2016; and
- Recycled Water Quality Plan– Flow, *Recycled Water Quality Plan (RWQP) (Revision 8)*, 31 August 2017.

¹ Water Futures/Cobbitty Consulting, *WICA Audit Report to IPART; Licence Plan Audit; (Recycled Water); Green Square Water (Version 4)*, 30 March 2016.

² The *Scheme Management Plan* was updated to Revision 4 subsequent to issue of the final audit report, but prior to issue of the updated final audit report.

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
- *Water Quality Plan (non-potable water) (WQP (npw))*.

Water Quality Plan (non-potable water) (WQP (npw)). 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 being undertaken. The Licence Holder 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 Tuesday, 21st March 2017. Further desktop auditing took place following the site audit, with additional evidence being provided up until 29th November 2017. As construction of the stormwater harvesting infrastructure had not been completed at the time of the initial site inspection, a further inspection was undertaken on 27th September 2017.

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, site inspections and review of photographs taken at the site. 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 addressed 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:

- Audit initiation and contribution to reporting of the audit, particularly aspects relating to the WQP (npw) components: Dr Dan Deere.
- The bulk of the detailed reporting of the audit, including in particular aspects relating to the IOP components: Mr Jim Sly.

Acknowledgements

The audit team notes, and greatly appreciates:

- the work and effort put in by those audited, including all Flow (Green Square Water) staff, particularly Laura Dixon, Mike Dahl and Glen Millott; and
- the presence of IPART representative, Javier Canon as an observer and commentator during the audit.

The cover photo image was taken by the auditors.

Audit grades

Audit grades have been 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_031 issued under the above framework (as granted on 25th September 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*.
- *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2); Stormwater Harvesting and Reuse, July 2009*.
- 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 and 4, and in full detail in the following Appendices:

- Appendix A for the *Infrastructure Operating Plan (IOP)*; and
- Appendix B for the *Water Quality Plan (non-potable water) (WQP (npw))*.

It should be noted that Flow (parent company of Green Square Water) has adopted a business management documentation system comprising generic management plans which must be read in conjunction with a scheme specific *Scheme Management Plan*. Requirements that must, under the provisions of the *Water Industry Competition Act 2006* and/or the *Water Industry Competition (General) Regulation 2008*, be addressed by one of the management plans are now jointly addressed by the *Scheme Management Plan* and the respective management plan.

3. Infrastructure Operating Plan

3.1 Summary of findings

There were no identified non-compliances in respect of the audited clauses of the *Water Industry Competition (General) Regulation 2008* related to the *Infrastructure Operating Plan*. Detailed assessment in respect of these clauses is presented in **Appendix A**.

3.2 Review of actions

The Licence Holder has not made any suggestions for corrections or clarifications following the issue of the draft report prior to the final report being issued.

3.3 Opportunities for improvement

No opportunities for improvement have been identified in respect of the *Infrastructure Operating Plan* as a result of this audit.

4. Water Quality Plan – Non-Potable Water

4.1 Summary of findings

There were no identified 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 B**.

4.2 Review of actions

Subsequent to issue of the final audit report and prior to issue of this updated final audit report, the Licence Holder has revised the *Scheme Management Plan* such that the intended uses of recycled water identified therein are consistent with the uses permitted by the Licence (refer **Table B.2**). This addresses comments made by IPART in respect of the final audit report and previous comments made by NSW Health.

4.3 Opportunities for improvement

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

- **OFI-GSW01:** There is an opportunity for Flow to review the possible implications of a change in water quality on the risk posed by *Legionella* for cooling towers and other aerosol generating exposures, such as car washing. This review can take place as part of Flow's periodic reviews of its water quality risks.
- **OFI-GSW02:** It is suggested that Green Square Water considers revising its *Scheme Management Plan* to more clearly state its intent in respect of the proposed ultrafiltration-related critical limits.
- **OFI-GSW03:** It is suggested that Green Square Water considers including the *Critical Control Points Schedule* and the *Validation and Verification Report* as supporting documents in section 2.1.4 of the *Scheme Management Plan*.

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

Table A.1 IOP Audit Table – WIC Reg Sched 1 cl.6(1)(a)

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.6(1)(a)	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.	Compliant

Risk

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.

Target for Full Compliance

Full development of the Infrastructure Operating Plan, including development of an Asset Management Plan and demonstrated implementation of the infrastructure management practices documented therein.

Evidence sighted

- Interviews with Flow/Green Square Water personnel on 21 March 2017.
- Site inspections of infrastructure on 21 March 2017 and 27 September 2017.
- Green Square Water, *Scheme Management Plan (Scheme MP) (Revision 4)*, 29 January 2018.
- Flow, *Infrastructure Operating Plan (IOP) (Revision 8)*, 21 December 2016.
- Flow Systems, *Asset Management Plan (AMP) (Revision 2)*, 22 November 2016.
- CMP Consulting Group/Green Square Water, *Green Square Water Reuse Scheme; Overall Site Plan* (Drawing No: GSW-130912-1140-OSP (Rev G)), March 2015.
- Flow, *Green Square Water Recycling Scheme (Reference: 9269-320-000 Simplified BFD-Scheme)*, undated.
- Flow, *Green Square – Local Water Centre – Treatment Plant; Design Report (Reference: 9269-E-R-211) (Issue No: 1)*, 9 October 2015.
- Flow, *Green Square – Local Water Centre; Functional Brief (Reference: 9269-E-R-200) (Issue No: 1)*, 12 September 2016.
- Flow, *Green Square Water; Local Water Centre Block Flow Diagram (Reference: 9269-320-000 (Rev 2))*, 13 October 2015.
- Flow, *Process and Instrumentation Diagrams (Reference: 2016.08.16 – P&ID Combined) [11 No Drawings 9269-300-001 to 011 of various revisions]*.
- Henry & Hymas, *Green Square Offtake Design; Civil Works (Reference: 15733) (Revision 0)*, 22 July 2016 (Drawing set comprising 11 sheets).
- Flow, *Green Square Town Centre Water Re-use Scheme: Commissioning Manual (Version 1)*, 15 September 2017.
- Flow/Green Square Water, *Validation and Verification Report; Stormwater Harvesting System (Version 2)*, 15 March 2017.
- Flow, *Green Square Town Centre Water Re-use Scheme: Operation and Maintenance Manual (Version 1)*, 15 September 2017 (table of contents only).
- Flow Systems, *Responsibilities and Authorities Matrix (Reference: FS-WAT-AUS-FM-OPS-1316-1)*, 8 August 2016.

Summary of reasons for grade

The *Infrastructure Operating Plan*, in conjunction with the *Scheme Management Plan* and other supporting documentation, indicates (at a high level) the arrangements adopted in relation to the design, construction, operation, maintenance and renewal (life cycle management) of the infrastructure. Furthermore, review of the evidence provided (and reference to other Flow schemes as examples) indicates that these arrangements being effectively implemented.

Accordingly, Green Square Water is considered to have demonstrated full compliance with this obligation.

Discussion and notes

Overview:

Infrastructure that is to be operated and maintained by Green Square Water will comprise non-potable (recycled) water infrastructure to service the Green Square development, including:

- stormwater harvesting infrastructure comprising offtake structure, sedimentation pit, screening chamber, gross pollutant trap (GPT), pumping station and rising main to a treatment plant;
- a recycled water treatment plant (Local Water Centre); and
- a recycled water distribution/reticulation system.

Arrangements in relation to the recycled water distribution/reticulation infrastructure have been assessed as part of a previous Licence Plan Audit.³ This audit is primarily focussed on the stormwater harvesting infrastructure and the recycled water treatment plant.

Design:

The *Infrastructure Operating Plan*⁴ identifies the standards to which the infrastructure is to be designed and constructed. Listed standards relevant to the proposed recycled water infrastructure include:

- Water Services Association of Australia (WSAA), *Water Supply Code of Australia (WSA 03)*;
- *Plumbing Code of Australia* (Volume 3 of the *National Construction Code*);
- AS 3735 *Concrete structure for retaining liquids*; and
- Flow Systems' Design Standards.

The *Scheme Management Plan* details the proposed arrangements in respect of both the stormwater harvesting and treatment facilities.⁵ These arrangements include:

- an offtake from the New Shea's Creek stormwater culvert (stormwater source);
- primary and secondary screening adjacent to the offtake;
- an offtake pumping station and rising main; and
- the recycled water treatment plant (LWC), which incorporates disc filtration, ultra-filtration (tertiary filtration), reverse osmosis (as required) and chlorination processes.

The design capacity of the recycled water infrastructure, including the treatment plant (Local Water Centre), are set out generically in the *Infrastructure Operating Plan*⁶ and more specifically in the *Scheme Management Plan*.⁷

The overall arrangement of the proposed infrastructure is shown on an *Overall Site Plan*⁸ and the scheme *Process Flow Diagram* (Simplified Block Flow Diagram).⁹ More specific details are presented in the *Design*

³ Water Futures/Cobbitty Consulting, *WICA Audit Report to IPART; Licence Plan Audit (Recycled Water); Green Square Water (Version 4)*, 30 March 2016

⁴ *Infrastructure Operating Plan*, section 2.3.

⁵ *Scheme Management Plan*, section 4.

⁶ *Infrastructure Operating Plan*, section 2.3.1.3.

⁷ *Scheme Management Plan*, section 4.2.

⁸ CMP Consulting Group/Green Square Water, *Green Square Water Reuse Scheme; Overall Site Plan* (Drawing No: GSW-130912-1140-OSP (Rev G)), March 2015.

Report¹⁰ and Functional Brief,¹¹ which include the Block Flow Diagram¹² and Process and Instrumentation Diagram (P&ID).¹³

Detailed arrangements for the infrastructure are shown on the relevant design drawings. For example, the Green Square Offtake Design; Civil Works¹⁴ drawings present full arrangements and structural details for the stormwater harvesting infrastructure.

In summary, the *Infrastructure Operating Plan* (in conjunction with the *Scheme Management Plan* and other supporting documentation) appropriately describes the arrangements in relation to the design of the infrastructure. Such arrangements identify and are consistent with the relevant codes and standards (as appropriate) and there is evidence that the documented requirements have been effectively implemented.

Construction:

The *Infrastructure Operating Plan* indicates that:¹⁵

“The Developer is typically responsible for construction of the reticulation networks in LH and HR schemes. In this case, Flow inspects the installations with its own Quality Assurance officers. Flow also requires a detailed QA package from the developer prior to providing its Compliance Certificate which the developer needs for subdivision registration. This QA package incorporates the requirement for photographic evidence of each and every lot’s connection to the reticulation network, pressure testing results, inspection and test plans and as-built drawings.”

The *Scheme Management Plan* again reiterates this approach, as follows:¹⁶

“The majority of the recycled water reticulation is installed by the developer as part of the construction of the new buildings’ infrastructure, however Flow Systems will be constructing a portion of the reticulation defined as Stage 1C and Stage 2.”

As this audit is focussed on the stormwater harvesting infrastructure and the recycled water treatment plant, the above provisions of the *Infrastructure Operating Plan* and *Scheme Management Plan* are not directly applicable; however, it is noted that:

- the stormwater harvesting infrastructure, including the rising main to the treatment plant; and
- the recycled water treatment plant

have been designed by and constructed under the direct supervision of Flow/Green Square Water.

As evidence of the arrangements in place to ensure that the stormwater harvesting and treatment infrastructure will be constructed in accordance with the design and appropriate standards, Green Square Water provided a copy of the *Commissioning Plan*,¹⁷ which sets out the arrangements (methodology) for pre-commissioning and commissioning of the various infrastructure and systems required for operation of the scheme. The *Commissioning Plan* also references a “*Verification Plan*” (part of the *Validation and Verification Report*),¹⁸ which includes details of the verification process requirements for the scheme.

During the audit site inspections undertaken on 21 March 2017 and 27 September 2017, visible components of the completed works were observed to be compliant with relevant standards.

⁹ Flow, *Green Square Water Recycling Scheme (Reference: 9269-320-000 Simplified BFD-Scheme)*, undated.

¹⁰ Flow, *Green Square – Local Water Centre – Treatment Plant; Design Report (Reference: 9269-E-R-211) (Issue No: 1)*, 9 October 2015.

¹¹ Flow, *Green Square – Local Water Centre; Functional Brief (Reference: 9269-E-R-200) (Issue No: 1)*, 12 September 2016.

¹² Flow, *Green Square Water; Local Water Centre Block Flow Diagram (Reference: 9269-320-000 (Rev 2))*, 13 October 2015.

¹³ Flow, *Process and Instrumentation Diagrams (Reference: 2016.08.16 – P&ID Combined) [11No Drawings 9269-300-001 to 011 of various revisions]*.

¹⁴ Henry & Hymas, *Green Square Offtake Design; Civil Works (Reference: 15733) (Revision 0)*, 22 July 2016 (Drawing set comprising 11 sheets).

¹⁵ *Infrastructure Operating Plan*, section 2.4.

¹⁶ *Scheme Management Plan*, section 5.3.

¹⁷ Flow, *Green Square Town Centre Water Re-use Scheme: Commissioning Manual (Version 1)*, 15 September 2017.

¹⁸ Flow/Green Square Water, *Validation and Verification Report; Stormwater Harvesting System (Version 2)*, 15 March 2017.

In summary, the *Infrastructure Operating Plan* (in conjunction with the *Scheme Management Plan* and other supporting documentation) appropriately describes the arrangements in relation to the construction of the infrastructure. Furthermore, there is evidence that the documented requirements in respect of the stormwater harvesting and treatment infrastructure have been effectively implemented.

Operation and Maintenance:

The *Infrastructure Operating Plan*¹⁹ indicates that an Operation and Maintenance Manual will be developed for the scheme. At the time of reporting, the *Operation and Maintenance Manual*²⁰ had not been fully documented; however, review of the table of contents indicates that it will address all relevant aspects. These include: Introduction/Purposes of Document; Contact Details; General Description of Installation; SCADA Screens and Controls; Operating Procedures; Maintenance Schedule; Emergency Responses; Equipment Schedules; Manufacturer's Literature – Equipment; Manufacturer's Literature – Instruments; Manufacturer's Literature – Valves; and As-Built Documentation.

It is noted that an Operation and Maintenance Manual is typically not finalised until completion of the commissioning and verification processes, which enables the inclusion of all relevant operating parameters. Previous review of Operation and Maintenance Manuals for other Flow schemes indicates that they typically provide appropriate and adequate guidance.

Information presented in the *Operation and Maintenance Manual* is expected to reflect and build on much of the detail presented in *Functional Brief*,²¹ which also provides a description of the system components and the arrangements for system control.

The *Responsibilities and Authorities Matrix*, which is referenced in the *Scheme Management Plan*,²² the *Infrastructure Operating Plan*²³ and other Business Management System documentation, indicates that operation and maintenance activities required to meet the requirements of the Licence are principally the responsibility of Flow Systems' (Green Square Water's parent company) Executive Manager Operations.²⁴ The *Responsibilities and Authorities Matrix* identifies a range of relevant "Operational" activities and activities related to the "Recycled Water Quality Management System" for which the Executive Manager Operations is responsible. These include (for example) but are not limited to:

- Develop and implement operational procedures, process control and verification of recycled water quality;
- Operate and maintain water, sewage and recycled water reticulation;
- Implement the maintenance management system; and
- Manage incidents and emergencies.

The Executive Manager Operations is supported in this role by the Manager Network Operations, Scheme Operator other Flow Systems staff and external service providers.

In summary, the *Infrastructure Operating Plan* describes (at a high level) the arrangements in relation to the operation and maintenance of the infrastructure; such arrangements are in part dependent upon having a detailed Operation and Maintenance Manual in place. The *Operation and Maintenance Manual* for the Green Square scheme had not been fully documented at the time of reporting; however, review of the table of contents indicates that it will address all relevant aspects. Based on previous audits of Flow schemes, an appropriately detailed Operation and Maintenance Manual (and/or supporting procedures will be in place prior to such infrastructure commencing operation.

¹⁹ *Infrastructure Operating Plan*, section 2.5.

²⁰ Flow, *Green Square Town Centre Water Re-use Scheme: Operation and Maintenance Manual (Version 1)*, 15 September 2017 (table of contents only).

²¹ Flow, *Green Square – Local Water Centre; Functional Brief (Reference: 9269-E-R-200) (Issue No: 1)*, 12 September 2016.

²² *Scheme Management Plan*, section 2.4.

²³ *Infrastructure Operating Plan*, section 1.5.

²⁴ Flow Systems, *Responsibilities and Authorities Matrix (Reference: FS-WAT-AUS-FM-OPS-1316-1)*, 8 August 2016.

Asset Management:

The *Infrastructure Operating Plan*²⁵ provides an overview of Flow's/Green Square Water's approach to the management of its assets. It also references the *Asset Management Plan* in which more detailed information about the adopted asset management processes is presented.

The *Infrastructure Operating Plan*:

- At an overview level, describes the key steps to be implemented in managing the asset portfolio; these steps are considered to be consistent with contemporary asset management practice.
- Indicates that an asset register will be maintained for each scheme; such a register is to include a list of assets, physical details, relative location, capacities and sources.
- Indicates that Flow will undertake an operational analysis of the present and future needs of the assets, the outputs from which will include the identification of capital investment requirements in respect of asset renewal, replacement and development.
- Indicates that Flow will conduct regular scheduled inspections of critical assets and record the results and any required corrective action in its enterprise Asset Management System (refer observations below).

The *Asset Management Plan* sets out a tactical plan for the management of the asset portfolio as a whole. It addresses key issues including:

- Strategic approach to Asset Management;
- Asset Management Organisation, including roles and responsibilities;
- A reference to the Flow Systems Business Management System, and the elements thereof (including policies and procedures);
- Maintenance Planning and Execution;
- Asset Condition and Risk Assessment;
- Asset Creation, Renewal and Disposal;
- Reporting and Planning; and
- Capital Investment.

It is noted that several opportunities for improvement in respect of the asset management system have been identified during other recent audits of Flow schemes.^{26,27} Those opportunities for improvement are not repeated in this report

In summary, the *Infrastructure Operating Plan* and *Asset Management Plan* together appropriately describe the arrangements in relation to the life cycle management of the infrastructure assets.

Summary:

The *Infrastructure Operating Plan*, in conjunction with the *Scheme Management Plan* and other supporting documentation, indicates (at a high level) the arrangements adopted in relation to the design, construction, operation, maintenance and renewal (life cycle management) of the infrastructure. Furthermore, review of the evidence provided (and reference to other Flow schemes as examples) indicates that these arrangements being effectively implemented.

Recommendations

There are no recommendations in respect of this obligation.

²⁵ *Infrastructure Operating Plan*, section 7.

²⁶ Cobbitty Consulting/Water Futures, *Flow Systems Operations (Shepherds Bay); Licence Plan Audit (Version 2.0)*, 24 October 2017, section 3.3 and table A.1.

²⁷ Cobbitty Consulting/Water Futures, *Discovery Point Water; Operational Audit (Version 2.1)*, 13 July 2017, section 4.3 and table B.1 (for example).

Opportunities for improvement

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

Table A.2 IOP Audit Table – WIC Reg Sched 1 cl.6(1)(b)

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.6(1)(b)	The IOP indicates the arrangements in relation to the continued safe and reliable performance of the infrastructure.	Compliant

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.

Evidence sighted

- Interviews with Flow/Green Square Water personnel on 21 March 2017.
- Site inspections of infrastructure on 21 March 2017 and 27 September 2017.
- Green Square Water, *Scheme Management Plan (Scheme MP) (Revision 4)*, 29 January 2018.
- Flow, *Infrastructure Operating Plan (IOP) (Revision 8)*, 21 December 2016.
- Flow Systems, *Asset Management Plan (AMP) (Revision 2)*, 22 November 2016.
- Flow Systems, *Recycled Water Quality Plan (RWQP) (Revision 4)*, 18 May 2017.
- Flow Systems, *Monitoring and Sampling Plan (MSP) (Revision 6)*, 22 November 2016.
- Flow, *Green Square Town Centre Water Re-use Scheme: Operation and Maintenance Manual (Version 1)*, 15 September 2017 (table of contents only).
- Flow, *Green Square – Local Water Centre; Functional Brief (Reference: 9269-E-R-200) (Issue No: 1)*, 12 September 2016.
- Flow Systems, *Responsibilities and Authorities Matrix (Reference: FS-WAT-AUS-FM-OPS-1316-1)*, 8 August 2016.
- Network Operator’s Licence No: 15_031 issued to Green Square Water Pty Ltd on 25 September 2015.
- Limcora Group website: <http://limcora.com.au/>.
- Flow/Green Square Water, *Green Square Scheme Risk Register*, printed 28 August 2017.

Summary of reasons for grade

The *Infrastructure Operating Plan*, in conjunction with the *Scheme Management Plan* and other supporting documentation, indicates (at a high level) the arrangements in relation to the continued safe and reliable performance of the infrastructure. Whilst detailed operation and maintenance procedures have not yet been fully documented, the intended arrangements are clear (refer also to discussion in Table A.1).

Accordingly, Green Square Water is deemed to have demonstrated compliance with this obligation.

Discussion and notes

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 described at a tactical level in the *Asset Management Plan*; more detailed operation and maintenance procedures are typically documented in an Operation and Maintenance (O&M) Manual developed specifically for each scheme.²⁸

²⁸ *Infrastructure Operating Plan*, section 2.5.

As noted in Table A.1, the *Operation and Maintenance Manual*²⁹ had not been fully documented at the time of reporting; however, review of the table of contents indicates that it will address all relevant aspects. As also noted, an Operation and Maintenance Manual is typically not finalised until completion of the commissioning and verification processes, which enables the inclusion of all relevant operating parameters. Previous review of Operation and Maintenance Manuals for other Flow schemes indicates that they typically provide appropriate and adequate guidance.

A *Functional Brief*,³⁰ which provides a description of the system components and the arrangements for system control (i.e. key information in respect of operation of the schemes), was available for review. It is expected that the *Operation and Maintenance Manual* will reflect and build on much of the detail presented in the *Functional Brief*.

In addition to the *Operation and Maintenance Manual*, operational procedures (including ongoing monitoring) aimed at ensuring the quality of the water supplied are documented in the *Recycled Water Quality Plan*³¹ and *Monitoring and Sampling Plan*.³²

Arrangements in respect of condition monitoring and planning for refurbishment/replacement of infrastructure are addressed in the *Asset Management Plan*.³³ Once fully populated and implemented, the Asset (Maintenance) Management System will provide an effective support tool for use in managing the ongoing maintenance and life-cycle management of the infrastructure.

As also discussed in Table A.1, responsibility for operation and maintenance is identified in the *Responsibilities and Authorities Matrix*, which is referenced in the *Scheme Management Plan*,³⁴ the *Infrastructure Operating Plan*³⁵ and other Business Management System documentation. The *Responsibilities and Authorities Matrix* indicates that operation and maintenance activities required to meet the requirements of the Licence are principally the responsibility of Flow Systems' (Green Square Water's parent company) Executive Manager Operations.³⁶

Effective performance of infrastructure is in part dependent upon the resources engaged for operation and maintenance. Review of curricula vitae for Flow's operational staff (Executive Manager Operations, Manager Network Operations and Scheme Operator) indicates that they are appropriately qualified and experienced for the purposes of operating the infrastructure. This assessment has been further validated by discussions with the Executive Manager Operations and Manager Network Operations during various previous audits of Flow schemes. It is noted that, as well as being Green Square Water's parent company, Flow is nominated as an "Authorised Persons" under the provisions of Green Square Water's Network Operator's Licence.

Flow (and its subsidiaries) has arrangements in place with several external service providers, including Limcora Group, NOV Mono BCIP Pty Ltd and Goldman Plumbing, to provide operational and maintenance support across its schemes on an as-required basis. Limcora will be the primary source of support in relation to the Green Square Water scheme. Review of the Limcora website³⁷ reveals that the company appears to have the requisite capacity to provide the required support.

The continued safe and reliable performance of the infrastructure is also dependent upon having a clear understanding of the associated risks. The *Infrastructure Operating Plan*³⁸ identifies "Asset condition and risk assessment" as part of the overall approach to asset management. The *Green Square Scheme Risk Register*³⁹ identifies hazards associated with the various components of the system and outlines appropriate control strategies. Many of the identified hazards/risks relate to infrastructure performance, with some (for example, power failure or chemical dosing pump failure) still assessed to be high risk with proposed control measures in place. The need to ensure that the proposed control measures continue to be implemented is

²⁹ Flow, *Green Square Town Centre Water Re-use Scheme: Operation and Maintenance Manual (Version 1)*, 15 September 2017 (table of contents only).

³⁰ Flow, *Green Square – Local Water Centre; Functional Brief (Reference: 9269-E-R-200) (Issue No: 1)*, 12 September 2016.

³¹ *Recycled Water Quality Plan*, section 6.

³² *Monitoring and Sampling Plan*, section 6.

³³ *Asset Management Plan*, sections 6 and 7.

³⁴ *Scheme Management Plan*, section 2.4.

³⁵ *Infrastructure Operating Plan*, section 1.5.

³⁶ Flow Systems, *Responsibilities and Authorities Matrix (Reference: FS-WAT-AUS-FM-OPS-1316-1)*, 8 August 2016.

³⁷ Limcora Group website: <http://limcora.com.au/>.

³⁸ *Infrastructure Operating Plan*, section 7.1 (table 2).

³⁹ Flow/Green Square Water, *Green Square Scheme Risk Register*, 28 August 2017.

acknowledged.

On the basis of the evidence provided, it is apparent that *Infrastructure Operating Plan*, in conjunction with the *Scheme Management Plan* and other supporting documentation, indicates (at a high level) the arrangements in relation to the continued safe and reliable performance of the infrastructure. Whilst detailed operation and maintenance procedures have not yet been fully documented (refer also to discussion in Table A.1), the intended arrangements are clear. This issue will be further addressed in the relevant New Infrastructure Audit Report.

Recommendations

There are no recommendations in respect of this obligation.

Opportunities for improvement

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

Table A.3 IOP Audit Table – WIC Reg Sched 1 cl.6(1)(c)

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.6(1)(c)	The IOP indicates the arrangements in relation to the continuity of the water supply and sewerage services.	Compliant

Risk

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.

Target for Full Compliance

Development and implementation of appropriate protocols for both unplanned and planned service interruptions.

Evidence sighted

- Interviews with Flow/Green Square Water personnel on 21 March 2017.
- Site inspections of infrastructure on 21 March 2017 and 27 September 2017.
- Green Square Water, *Scheme Management Plan (Scheme MP) (Revision 4)*, 29 January 2018.
- Flow, *Infrastructure Operating Plan (IOP) (Revision 8)*, 21 December 2016.
- Flow Systems, *Customer Contract*, 30 October 2015, available at: <http://flowsystems.com.au/governance/CustomerContract.pdf>.
- Sydney Water, *Operating Licence 2015-2020; Schedule 4 Customer Contract*, undated (refer: https://www.sydneywater.com.au/web/groups/publicwebcontent/documents/webasset/zgrf/mdc0/~edisp/dd_074203.pdf; accessed on 22 August 2017).

Summary of reasons for grade

Green Square Water has arrangements in place for ensuring (as far as practical) the continuity of water supply; these arrangements are documented in the *Infrastructure Operating Plan* and *Scheme Management Plan*.

Furthermore, it has developed protocols (commitments), documented in its *Customer Contract*, in respect of unplanned and planned service interruptions. These protocols are consistent with industry standards.

Accordingly, it is assessed that Green Square Water is compliant with this obligation.

Discussion and notes

The continuity of the recycled water supply services may be subject to either planned or unplanned interruptions. This is consistent with the servicing provisions provided to both similar 'high rise' developments and the broader community.

Scenarios that may impact the continuity of recycled water services and arrangements for addressing any discontinuity are identified in the "Continuity of Services" provisions of the *Infrastructure Operating Plan*⁴⁰ and the "System Redundancy" provisions of the *Scheme Management Plan*.⁴¹

Continuity of recycled water supply is to be achieved through:⁴²

- "commercial agreements between Flow Systems and City of Sydney Council and City of Sydney Council with Sydney Water that will include drinking water availability as top up for recycled water.
- significant redundancy being provided by the recycled water storage tanks, which will provide up to 72 hours supply at peak demand.

⁴⁰ *Infrastructure Operating Plan*, section 6.2.

⁴¹ *Scheme Management Plan*, section 5.5.

⁴² *Scheme Management Plan*, section 5.5.

-
- *recycled water distribution pumps being installed in duty/standby arrangement at LWC.*

The *Infrastructure Operating Plan* makes reference to a Utility Services Agreement, as follows:⁴³

“... a Utility Services Agreement (USA) with the local Public Water Utility (PWU) for, amongst other things, the supply of drinking water for each scheme.

USAs are prepared following the preparation of a water servicing strategy that models the forecast drinking water demand including some allowance (but not full redundancy) for back up supply for the recycled water network.

Water Servicing Strategies and USAs also forecast the Recycled Water (Phase 1) servicing where the LWC is not commissioned and therefore the recycled water mains must be filled and charged with drinking water.”

The following observations are made in respect of these measures:

- Drinking water to be used in conjunction with the Green Square recycled water scheme will be supplied under a standard customer agreement between Sydney Water and the City of Sydney Council, as noted in the *Scheme Management Plan*. A Utility Services Agreement will not be in place between Flow Systems and Sydney Water for the purposes of the Green Square development.
- Under the initial operating regime whereby the recycled water treatment plant has not been brought into service (in place at the time of the audit), the recycled water distribution/reticulation network is charged with drinking water.
- Whilst not being used at the time of the audit inspection (i.e. under the initial operating regime), the recycled water storage tanks will be brought into service in conjunction with the treatment plant. Provisions have been incorporated for potable water top up, with an air break visible within the treatment plant room.

Measures to be implemented in the event of a failure include:⁴⁴

- *“Minimisation of demand through customer notifications.*
- *Rapid response to infrastructure failure.”*

The *Customer Contract* sets out Green Square Water’s commitment to its customers in the event of either unplanned or planned interruptions.⁴⁵ This commitment is generally consistent with the commitment to residential customers in Sydney Water’s *Customer Contract*.⁴⁶

The *Customer Contract* also sets out Green Square Water’s commitment to its customers in the event of water restrictions resulting from drought or a major operational difficulty.⁴⁷

In summary, Green Square Water has arrangements in place for ensuring (as far as practicable) the continuity of the recycled water supply. Furthermore, it has developed protocols in respect of unplanned and planned service interruptions; these are generally consistent with industry standards.

Recommendations

There are no recommendations in respect of this requirement.

Opportunities for improvement

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

⁴³ *Infrastructure Operating Plan*, section 5.5.

⁴⁴ *Scheme Management Plan*, section 5.5.

⁴⁵ *Customer Contract*, sections 3.3.1 and 3.3.2.

⁴⁶ Sydney Water, *Operating Licence 2015-2020; Schedule 4 Customer Contract*, undated (refer: https://www.sydneywater.com.au/web/groups/publicwebcontent/documents/webasset/zgrf/mdc0/~edisp/dd_074203.pdf; accessed on 22 August 2017).

⁴⁷ *Customer Contract*, sections 3.3.3 and 3.3.4.

Table A.4 IOP Audit Table – WIC Reg Sched 1 cl.6(1)(d)

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.6(1)(d)	The IOP indicates the arrangements in relation to alternative water supplies and sewerage services when the infrastructure is inoperable.	Compliant
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.	
Evidence sighted		
<ul style="list-style-type: none">Interviews with Flow/Green Square Water personnel on 21 March 2017.Site inspections of infrastructure on 21 March 2017 and 27 September 2017.Green Square Water, <i>Scheme Management Plan (Scheme MP) (Revision 4)</i>, 29 January 2018.Flow, <i>Infrastructure Operating Plan (IOP) (Revision 8)</i>, 21 December 2016.Flow, <i>Incident Management Plan (Revision 6)</i>, 14 October 2016.Flow Systems, <i>Customer Contract</i>, 30 October 2015, available at: http://flowsystems.com.au/governance/CustomerContract.pdf.		
Summary of reasons for grade		
Green Square Water has documented its arrangements for the provision of alternative recycled water supplies (specifically potable water top-up) when the infrastructure is inoperable in the <i>Infrastructure Operating Plan</i> and <i>Incident Management Plan</i> . Accordingly, it is assessed that Green Square Water is compliant with this requirement.		
Discussion and notes		
The <i>Infrastructure Operating Plan</i> ⁴⁸ refers to the <i>Incident Management Plan</i> and “ <i>Specific Incident Response Procedures ...</i> ” as guidance for responding to an interruption to the supply of recycled water.		
Whilst the <i>Incident Management Plan</i> does not include specific response procedure for a recycled water supply service interruption, it does provide a framework for responding to any incident. Furthermore, it identifies requirements in respect of customer notification, as well as indicating that: ⁴⁹		
<i>“For a significant outage the Executive Manager Operations is responsible for arranging alternative supply.”</i>		
Green Square Water’s <i>Customer Contract</i> identifies circumstances in which Green Square Water may be unable to maintain the supply of recycled water. These circumstances include: ⁵⁰		
<ul style="list-style-type: none">planned or unplanned interruptions;major operational difficulties;circumstances in which it (Green Square Water) is entitled to restrict supply; andevents beyond the reasonable control of Green Square Water.		
As discussed in Table A.3, arrangements are in place for the use of drinking water as both the initial source of supply for the recycled water scheme and as top up (an alternative supply) for recycled water once the		

⁴⁸ *Infrastructure Operating Plan*, section 6.2.4.

⁴⁹ *Incident Management Plan*, section 5.4.

⁵⁰ *Customer Contract*, section 3.1.2.

proposed treatment plant is operational.

In summary, Green Square Water has identified the arrangements in relation to alternative recycled water supplies when the infrastructure is inoperable.

Recommendations

There are no recommendations in respect of this requirement.

Opportunities for improvement

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

Table A.5 IOP Audit Table – WIC Reg Sched 1 cl.6(1)(e)

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.6(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		
<ul style="list-style-type: none">▪ Interviews with Flow/Green Square Water personnel on 21 March 2017.▪ Site inspections of infrastructure on 21 March 2017 and 27 September 2017.▪ Green Square Water, <i>Scheme Management Plan (Scheme MP) (Revision 4)</i>, 29 January 2018.▪ Flow, <i>Infrastructure Operating Plan (IOP) (Revision 8)</i>, 21 December 2016.▪ Flow Systems, <i>Recycled Water Quality Plan (RWQP) (Revision 4)</i>, 18 May 2017.▪ Flow Systems, <i>Monitoring and Sampling Plan (MSP) (Revision 6)</i>, 22 November 2016.▪ Flow Systems, <i>Customer Contract</i>, 30 October 2015, available at: http://flowsystems.com.au/governance/CustomerContract.pdf.		
Summary of reasons for grade		
<p>The <i>Infrastructure Operating Plan</i> indicates the arrangements in relation to the maintenance, monitoring and reporting of standards of service, which are documented in the <i>Customer Contract</i>. Reference is made to additional detail documented in the <i>Recycled Water Quality Plan</i> and <i>Monitoring and Sampling Plan</i>.</p> <p>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.</p> <p>Accordingly, Green Square Water is assessed as being compliant with this requirement.</p>		
Discussion and notes		
Overview:		
<p>The <i>Infrastructure Operating Plan</i>⁵¹ provides an overview of the arrangements for monitoring and reporting; the monitoring and reporting systems provide information on a number of characteristics including, but not limited to, internal and regulatory performance indicators. Information is to be recorded and reported in accordance with relevant policies and procedures, including the <i>Flow Systems Records Management Procedure</i>.⁵²</p>		
Recycled Water:		
<p>The <i>Recycled Water Quality Plan</i> provides further detail in respect of both monitoring⁵³ (including reference to the <i>Monitoring and Sampling Plan</i>) and reporting of results.⁵⁴ It also identifies various reports to be prepared, their purpose, frequency, responsibility for preparation and distribution.</p>		

⁵¹ *Infrastructure Operating Plan*, section 8.1.

⁵² Whilst this procedure was not sighted during the audit, Flow's document management system has been briefly demonstrated during previous audits.

⁵³ *Recycled Water Quality Plan*, sections 5.2 and 6.1.

⁵⁴ *Recycled Water Quality Plan*, section 11.2.

The *Monitoring and Sampling Plan*⁵⁵ outlines requirements in respect of desktop validation, operational monitoring and verification monitoring of recycled water quality. Verification monitoring requirements include both monitoring frequency and guideline values for verification parameters.

Under the provisions of the *Customer Contract*, Green Square Water is obligated to supply recycled water compliant with:⁵⁶

“... the Australian Guidelines for Water Recycling 2006 (Phase 1 Managing Health & Environmental Risks) National Water Quality Management Strategy or as approved by the relevant Federal and/or State health authorities.”

It is also required to:⁵⁷

“... use our best endeavours to ensure that the recycled water we supply to your Property is at the minimum pressure of 10 metres head.”

Accordingly, it is appropriate that the arrangements for the monitoring and reporting of standards of service include both recycled water quality and pressure, as identified in the *Recycled Water Quality Plan*⁵⁸ and *Scheme Management Plan*⁵⁹ respectively.

Customer Complaints:

It is noted that, in addition to the identified monitoring, Green Square Water is also reliant upon customer complaints to identify any failure to meet performance standards. This is consistent with practices adopted by other water utilities.

Recommendations

There are no recommendations in respect of this requirement.

Opportunities for improvement

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

⁵⁵ *Monitoring and Sampling Plan*, section 6.

⁵⁶ *Customer Contract*, section 3.1.2.

⁵⁷ *Customer Contract*, section 3.1.2.

⁵⁸ *Recycled Water Quality Plan*, sections 5.2 and 6.1.

⁵⁹ *Scheme Management Plan*, section 5.1.2.

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

Table B.1 WQP (npw) element one

Clause	Requirement	Compliance Grade
WIC Reg Sched 1 cl.7(1)(b)	<p>Element one</p> <p>The WQP (npw) shows a commitment to responsible use and management of recycled water quality.</p>	Compliant
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 Flow/Green Square Water personnel on 21 March 2017. ▪ Site inspections of infrastructure on 21 March 2017 and 27 September 2017. ▪ Green Square Water, <i>Scheme Management Plan (Scheme MP) (Revision 4)</i>, 29 January 2018. ▪ Flow Systems, <i>Recycled Water Quality Plan (RWQP) (Revision 8)</i>, 31 August 2017. ▪ Flow Systems, <i>Recycled Water Policy</i>, 23 October 2014. ▪ Flow, <i>Compliance Register</i>, updated 7 September 2017. ▪ Flow Systems, <i>Customer Contract</i>, 30 October 2015, available at: http://flowsystems.com.au/governance/CustomerContract.pdf. ▪ Flow, <i>Emergency Contact List (Reference: FS-WAT-NSW-FM-INC-1231)</i>, 11 September 2017. ▪ Flow, <i>Risk Workshop Sign-on Sheet</i> for Green Square Water Risk Workshop, 2 June 2016. ▪ Flow, <i>Responsibilities and Authorities Matrix (Reference: FS-WAT-AUS-FM-OPS-1316-1)</i>, 8 August 2016. 		
Summary of reasons for grade		
<p>Green Square Water 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>Accordingly, Green Square Water is assessed to have demonstrated compliance with this obligation.</p>		
Discussion and notes		
Overview:		
<p>Green Square Water’s commitment to recycled water quality management is outlined in the <i>Recycled Water Quality Plan</i>,⁶⁰ which should be read in conjunction with the further detail provided in the <i>Scheme Management Plan</i>.⁶¹ Specific arrangements are discussed in the following.</p>		
Responsible use of recycled water:		
<p>The <i>Recycled Water Quality Plan</i>⁶² outlines arrangements for ensuring the responsible use of recycled water,</p>		

⁶⁰ *Recycled Water Quality Plan*, section 2.

⁶¹ *Scheme Management Plan*, section 6 (table 7).

which include:

- Engaging with agencies with responsibilities and expertise in protection of public and environmental health, including the local Public Health Authority, the Environment Protection Authority and IPART.
- Ensuring that design of the schemes is undertaken by reputable and experienced companies in accordance with the relevant codes and standards.
- Employing experienced personnel to manage the recycled water scheme.
- Complying with the regulatory requirements of IPART, NSW Health, NSW Planning and Environment and the NSW Office of Water.

Regulatory of formal requirements:

There is a list of regulatory and formal requirements within the *Recycled Water Quality Plan*⁶³ and *Scheme Management Plan*.⁶⁴ The lists are not exhaustive, but cover the main requirements relevant to recycled water quality management.

Flow Systems uses a *Compliance Register*⁶⁵ in order to fully comply with this requirement. Another key document (which is not identified in the *Compliance Register*) is the *Customer Contract*.⁶⁶

Partnerships and engagement of stakeholders:

The *Recycled Water Quality Plan*⁶⁷ identifies stakeholders that have an interest in management of the recycled water scheme. Flow also has an *Emergency Contact List*⁶⁸ that includes a listing of key stakeholders and up-to-date contact details for all those stakeholders across each of its operating schemes.

There was evidence of Flow/Green Square Water engagement with key stakeholders. For example, the *Risk Workshop Sign-on Sheet*⁶⁹ shows that, in addition to relevant Flow personnel, representatives of the following participated in the Risk Assessment workshop held on 2 June 2016:

- NSW Health Sydney Local Health District Public Health Unit (Graham Burgess, Deputy Director – Senior Environmental Health Officer, Shivani Nair, Environmental Health Officer and Marianne Dowsett, Medical Trainee);
- City of Sydney (Chris Collins, Manager Green Infrastructure, Lisa Currie, Manager Water Strategy, Jacqui Brooks, Program Manager – Parks Services, and Damon La'rance, Project Manager); and
- IPART (Jamie Luke, Senior Technical Analyst).

Mechanisms used by Flow/Green Square Water to engage with users of recycled water to ensure that responsibilities are identified and understood are also outlined in the *Recycled Water Quality Plan*.⁷⁰ These include (for example) the *Customer Contract*, *Homeowner's Guide* and the scheme specific websites (as discussed in more detail in Table B.8).

Recycled water policy:

Flow/Flow Systems Operations has a *Recycled Water Policy*⁷¹ 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 Flow 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

⁶² *Recycled Water Quality Plan*, section 2.1.

⁶³ *Recycled Water Quality Plan*, Section 2.2.

⁶⁴ *Scheme Management Plan*, section 2.2.

⁶⁵ Flow, *Compliance Register*, updated 7 September 2017.

⁶⁶ Flow Systems, *Customer Contract*, 30 October 2015, available at:

<http://flowsystems.com.au/governance/CustomerContract.pdf>.

⁶⁷ *Recycled Water Quality Plan*, section 2.3.

⁶⁸ Flow, *Emergency Contact List (Reference: FS-WAT-NSW-FM-INC-1231)*, 11 September 2017.

⁶⁹ Flow, *Risk Workshop Sign-on Sheet* for Green Square Water Risk Workshop, 2 June 2016.

⁷⁰ *Recycled Water Quality Plan*, section 2.3 (table 4).

⁷¹ Flow Systems, *Recycled Water Policy*, 23 October 2014.

companies.

- Based on discussions with relevant Flow personnel during this and previous audits, it is clear that they are aware of the policy and the associated obligations.

Furthermore, responsibilities in respect of the communication, awareness and implementation of both the *Recycled Water Quality Plan* and the *Recycled Water Policy* are clearly identified in the *Responsibilities and Authorities Matrix*.⁷²

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.

⁷² Flow, *Responsibilities and Authorities Matrix* (Reference: FS-WAT-AUS-FM-OPS-1316-1), 8 August 2016.

Table B.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.	Compliant
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

- Interviews with Flow/Green Square Water personnel on 21 March 2017.
- Site inspections of infrastructure on 21 March 2017 and 27 September 2017.
- Green Square Water, *Scheme Management Plan (Scheme MP) (Revision 4)*, 29 January 2018.
- Flow Systems, *Recycled Water Quality Plan (RWQP) (Revision 8)*, 31 August 2017.
- New South Wales Government, *Network Operator’s Licence No: 15_031* (as issued on 25 September 2015).
- CMP Consulting Group/Green Square Water, *Green Square Water Reuse Scheme; Overall Site Plan* (Drawing No: GSW-130912-1140-OSP (Rev G)), March 2015.
- Flow, *Green Square Water Recycling Scheme (Reference: 9269-320-000 Simplified BFD-Scheme)*, undated.
- Flow, *Green Square – Local Water Centre – Treatment Plant; Design Report (Reference: 9269-E-R-211) (Issue No: 1)*, 9 October 2015.
- Flow, *Green Square – Local Water Centre; Functional Brief (Reference: 9269-E-R-200) (Issue No: 1)*, 12 September 2016.
- Flow, *Green Square Water; Local Water Centre Block Flow Diagram (Reference: 9269-320-000 (Rev 2))*, 13 October 2015.
- Flow, *Process and Instrumentation Diagrams (Reference: 2016.08.16 – P&ID Combined)* [11No Drawings 9269-300-001 to 011 of various revisions].
- Henry & Hymas, *Green Square Offtake Design; Civil Works (Reference: 15733) (Revision 0)*, 22 July 2016 (Drawing set comprising 11 sheets).
- Flow, *Risk Workshop Sign-on Sheet* for Green Square Water Risk Workshop, 2 June 2016.
- Flow/Green Square Water, *Green Square Scheme Risk Register*, printed 28 August 2017.
- Email dated 6 November 2017 from City of Sydney to Flow (re: *Notification of Pollution Incidents*).

Summary of reasons for grade

Green Square Water demonstrated that the *Recycled Water Quality Plan*, in conjunction with the *Scheme Management 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*.

Accordingly, Green Square Water is assessed to have demonstrated compliance with this obligation.

Discussion and notes

Overview:

An assessment of the recycled water supply system is outlined in the *Recycled Water Quality Plan*,⁷³ which should be read in conjunction with the detail provided in the *Scheme Management Plan*.⁷⁴ Specific arrangements are discussed in the following.

It is noted that this audit is specifically focussed on the stormwater harvesting and treatment components of the scheme; the distribution/reticulation components of the scheme have been assessed as part of a previous Licence Plan Audit.⁷⁵

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

The *Scheme Management Plan*⁷⁶ indicates that stormwater base flows in the Shea's Creek stormwater culvert will be the water source for the recycled water system treatment process. Further discussion in respect of the quality of the source water is presented below.

The recycled water treatment plant is to be designed for an ultimate capacity of 900 kL/day. The base flow of 20 L/sec in Shea's Creek⁷⁷ equates to some 1,700kL/day, which is well in excess of the design flow for the scheme.

The *Scheme Management Plan*⁷⁸ also identifies the intended uses of recycled water as: Cooling tower make-up water; Toilet flushing; Irrigation; Cold tap for washing machines; Water features; and Street cleaning. These proposed uses are consistent with those permitted by the Licence.⁷⁹

Both the *Recycled Water Quality Plan*⁸⁰ and the *Scheme Management Plan*⁸¹ indicate that people can be exposed to recycled water "...via direct ingestion, aspiration of aerosols, aspiration of spray or ingestion via contact with skin or clothing." Those people potentially exposed to recycled water include: Communities in the vicinity of application sites; Household occupants; Commercial customers; Visitors to site; Local Water Centre (treatment plant) operators; and Local plumbers.

The *Scheme Management Plan*⁸² indicates that potential receiving environments at Green Square include vegetation and soils. It further notes that, Green Square Water will have a Trade Waste Agreement in place with Sydney Water for the disposal of wastewater as trade waste. Source water that is out-of-specification for treatment will be re-diverted back to the stormwater network. Recycled water infrastructure will be located almost entirely within buildings or underground; the risk of discharge to the environment is therefore minimal.

Recycled water systems analysis:

The Green Square recycled water scheme will ultimately comprise:

- stormwater harvesting infrastructure comprising offtake structure, sedimentation pit, screening chamber, gross pollutant trap (GPT), pumping station and rising main to a treatment plant;
- a recycled water treatment plant (Local Water Centre); and
- a recycled water distribution/reticulation system.

Under the current (initial) operating arrangements (i.e. until the stormwater harvesting infrastructure and treatment plant are commissioned and commence commercial operation), the distribution/reticulation system is charged with potable water. As noted above, the distribution/reticulation system has been the

⁷³ *Recycled Water Quality Plan*, section 3.

⁷⁴ *Scheme Management Plan*, sections 4 and 5 (table 7 and section 6.1).

⁷⁵ Water Futures/Cobbitty Consulting, *WICA Audit Report to IPART; Licence Plan Audit (Recycled Water); Green Square Water (Version 4)*, 30 March 2016.

⁷⁶ *Scheme Management Plan*, section 6.1.1.1.

⁷⁷ *Scheme Management Plan*, section 5.4 (table 6).

⁷⁸ *Scheme Management Plan*, section 6.1.1.2.

⁷⁹ New South Wales Government, *Network Operator's Licence No: 15_031* (as issued on 25 September 2015), table 1.3.

⁸⁰ *Recycled Water Quality Plan*, section 3.1.3.

⁸¹ *Scheme Management Plan*, section 6.1.1.3.

⁸² *Scheme Management Plan*, section 6.1.1.4.

subject of a previous audit.

The overall arrangement of the scheme is described in the *Scheme Management Plan*⁸³ and is shown on an *Overall Site Plan*⁸⁴ and the scheme *Process Flow Diagram* (Simplified Block Flow Diagram).⁸⁵ More specific details, including the design basis for the scheme, are presented in the *Design Report*⁸⁶ and *Functional Brief*,⁸⁷ which include the *Block Flow Diagram*⁸⁸ and *Process and Instrumentation Diagram* (P&ID).⁸⁹

Detailed arrangements for the infrastructure are shown on the relevant design drawings. For example, the *Green Square Offtake Design; Civil Works*⁹⁰ drawings present full arrangements and structural details for the stormwater harvesting infrastructure.

Both the *Recycled Water Quality Plan*⁹¹ and *Scheme Management Plan*⁹² identify the in-house personnel and external stakeholder organisations that are typically invited to assist in the system analysis, which is undertaken as part of the risk assessment process. Evidence of participation in the process, including details of people involved and the organisations/functions they represent is provided by the *Risk Workshop Sign-on Sheet*.⁹³

Periodic review of the system analysis is undertaken as part of the annual review of the risk assessment. This annual review is managed through Flow's document management system, which issues a reminder when review of the *Risk Register* is required.

Assessment of water quality data:

As noted above, source water for the recycled water system will comprise stormwater drawn from the Shea's Creek culvert, which runs through the development site; a treatment plant that will produce recycled water is an integral component of the scheme. Green Square Water has sampled and tested the stormwater to verify water quality and confirm that it is suitable for treatment; details are presented in both the *Scheme Management Plan*⁹⁴ and the *Design Report*.⁹⁵

Further analysis will be undertaken during commissioning and the subsequent operating period to validate and (if necessary) update the design basis of the treatment plant.

Hazard identification and risk assessment:

A *Hazard Identification and Risk Assessment Workshop* was undertaken on 2 June 2016.

Review of the *Risk Workshop Sign-on Sheet*⁹⁶ shows that representatives of the following participated in the workshop:

- Flow/Green Square Water (Andrew Horton, Executive Manager Operations; Darren Wharton, Executive Manager Project Delivery; Mike Dahl Project Manager; Glen Millott, Engineering Manager; Ned Campbell, Project Engineer; and Laura Dixon, Risk and Compliance Manager.
- NSW Health Sydney Local Health District Public Health Unit (Graham Burgess, Deputy Director – Senior

⁸³ *Scheme Management Plan*, sections 4 (stormwater harvesting and treatment) and 5 (distribution system).

⁸⁴ CMP Consulting Group/Green Square Water, *Green Square Water Reuse Scheme; Overall Site Plan* (Drawing No: GSW-130912-1140-OSP (Rev G)), March 2015.

⁸⁵ Flow, *Green Square Water Recycling Scheme (Reference: 9269-320-000 Simplified BFD-Scheme)*, undated.

⁸⁶ Flow, *Green Square – Local Water Centre – Treatment Plant; Design Report (Reference: 9269-E-R-211) (Issue No: 1)*, 9 October 2015.

⁸⁷ Flow, *Green Square – Local Water Centre; Functional Brief (Reference: 9269-E-R-200) (Issue No: 1)*, 12 September 2016.

⁸⁸ Flow, *Green Square Water; Local Water Centre Block Flow Diagram (Reference: 9269-320-000 (Rev 2))*, 13 October 2015.

⁸⁹ Flow, *Process and Instrumentation Diagrams (Reference: 2016.08.16 – P&ID Combined) [11No Drawings 9269-300-001 to 011 of various revisions]*.

⁹⁰ Henry & Hymas, *Green Square Offtake Design; Civil Works (Reference: 15733) (Revision 0)*, 22 July 2016 (Drawing set comprising 11 sheets).

⁹¹ *Recycled Water Quality Plan*, section 3.2.2

⁹² *Scheme Management Plan*, section 6.1.2.2.

⁹³ Flow, *Risk Workshop Sign-on Sheet for Green Square Water Risk Workshop*, 2 June 2016.

⁹⁴ *Scheme Management Plan*, section 6.1.3.1.

⁹⁵ Flow, *Green Square – Local Water Centre – Treatment Plant; Design Report (Reference: 9269-E-R-211) (Issue No: 1)*, 9 October 2015, section 4.1.

⁹⁶ Flow, *Risk Workshop Sign-on Sheet for Green Square Water Risk Workshop*, 2 June 2016.

Environmental Health Officer; Shivani Nair, Environmental Health Officer; and Marianne Dowsett, Medical Trainee);

- City of Sydney (Chris Collins, Manager Green Infrastructure; Lisa Currie, Manager Water Strategy; Jacqui Brooks, Program Manager – Parks Services; and Damon La'rance, Project Manager); and
- IPART (Jamie Luke, Senior Technical Analyst).

It is considered that these representatives brought adequate and appropriate experience for the purposes of conducting the risk assessment.

The workshop, which addressed the full extent of the proposed recycled water scheme at Green Square, was undertaken using a methodology that was generally compliant with the approach outlined in the *Australian Guidelines for Water Recycling* (AGWR). The outcomes are documented in the *Green Square Scheme Risk Register*.⁹⁷

An extensive range of hazardous events have been identified in respect of the recycled water system and controls/mitigation measures identified. One hazardous event (Health impact from exposure to public and private water features) is assessed to remain a very high residual risk following the implementation of controls, whilst a further twenty-two (22) hazardous events remain high residual risks following the implementation of controls.

In respect of these hazards, *Green Square Scheme Risk Register* indicates that:

- for the very high residual risk hazard:
"Risks to be mitigated by the owner of the water features (City of Sydney)."
- for the high residual risk hazards:
"The residual risk is still high as many controls have been put in place which can reduce the likelihood of the risk but they cannot reduce the consequence. The high risk ensures that we focus on keeping the controls implemented."

It is noted that one of the hazardous events considered as part of the risk assessment is:

"Major accidental discharge of raw sewage to the stormwater catchment. Characteristics of raw stormwater are outside design influent parameters leading to reduced or compromised treatment capacity of the treatment plant."

The identified controls include, but are not limited to:

- Catchment land not zoned for heavy industrial uses;
- Dilution of spills during rain events when overflows are expected to occur;
- Treatment plant Log Reduction Credits are in excess of those required for the end uses;
- Pre-treatment of stormwater using two GPTs prior to delivery of water to treatment plant;
- Key raw water indicators to be continuously monitored via the site SCADA (online monitoring of pH, Electrical Conductivity (EC), Turbidity);
- Automatic diversion of raw water away from plant if not within prescribed pH, EC and Turbidity criteria;
- Set up notification protocol with Sydney Water; and
- Explore notification protocol with fire brigade/hazmat.

In respect of the notification of pollution incidents within the stormwater catchment, Green Square Water provided evidence that Flow is to be included in the City of Sydney's communication protocol, as follows:⁹⁸

"The City is in the process of updating our communication protocol with regards to water quality incident notification in stormwater catchments where the City owns/operates stormwater harvesting schemes.

At this stage, we plan to work with Council's Health and Building regulatory department (who receive

⁹⁷ Flow/Green Square Water, *Green Square Scheme Risk Register*, printed 28 August 2017.

⁹⁸ Email dated 6 November 2017 from City of Sydney to Flow (re: *Notification of Pollution Incidents*).

pollution incident notifications under the POEO Act) and be added to their incident notification procedure. The other communication channel we will look into is the sewer overflow notification process with Sydney Water.

I expect the City to include Flow Systems (and other operators of City stormwater harvesting schemes) in the updated communication protocol. When the City has investigated internal and Sydney Water opportunities further, I'll be in touch so we can work together on incorporating Flow Systems into the protocol."

In summary, review of the *Green Square Scheme Risk Register* leads to the assessment that the hazard identification and risk assessment process appropriately addresses the Green Square recycled water scheme. Furthermore, arrangements are being put in place to address the risk of pollution within the stormwater catchment.

One emerging issue that is worthy of consideration and covering off, albeit not urgent due to the probable low likelihood of an adverse consequence arising in this context, is the possible relationship between changing water quality and *Legionella* risk. Stormwater is potentially more corrosive and of different chemistry (softer and of lower pH) than stabilised tap water as normally supplied in Sydney. Given recent historical events in Flint, Michigan, in the United States,⁹⁹ it is worth Flow reviewing the possible implications of a change in water quality from stabilised potable water, as used historically in this part of Sydney, to recycled stormwater, on the risk posed by *Legionella*, given that recycled water is used for cooling towers and other aerosol generating exposures, such as car washing. Changes in water quality can have indirect implications on corrosion-related iron leaching, water temperature, disinfectant residual demand and cooling tower biocide controls. These risks, and any modifications to controls if required, are worth considering, possibly in liaison with the cooling tower management contractor for the site. This review can take place as part of Flow's periodic reviews of its water quality risks. An opportunity for improvement (**OFI-GSW01**) has been identified in respect of this matter.

Recommendations

There are no recommendations in respect of this obligation.

Opportunities for improvement

The following opportunity for improvement was identified as a result of the audit of this requirement:

- **OFI-GSW01:** There is an opportunity for Flow to review the possible implications of a change in water quality on the risk posed by *Legionella* for cooling towers and other aerosol generating exposures, such as car washing. This review can take place as part of Flow's periodic reviews of its water quality risks.

⁹⁹ See for instance: <http://edition.cnn.com/2017/03/30/health/legionnaires-disease-flint-water-crisis-study/index.html>

Table B.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.	Compliant

Risk

Target for Full Compliance

Failure to adequately define preventive measures and assess residual risks could lead to risks being overlooked.

Adequate definition of preventive measures and residual risk assessment.

Evidence sighted

- Interviews with Flow/Green Square Water personnel on 21 March 2017.
- Site inspections of infrastructure on 21 March 2017 and 27 September 2017.
- Green Square Water, *Scheme Management Plan (Scheme MP) (Revision 4)*, 29 January 2018.
- Flow Systems, *Recycled Water Quality Plan (RWQP) (Revision 8)*, 31 August 2017.
- Flow/Green Square Water, *Green Square Scheme Risk Register*, printed 28 August 2017.
- Flow, *Green Square – Local Water Centre – Treatment Plant; Design Report (Reference: 9269-E-R-211) (Issue No: 1)*, 9 October 2015.
- Flow/Green Square Water, *Validation and Verification Report; Stormwater Harvesting System (Version 2)*, 15 March 2017.
- Flow, *Green Square Water; Local Water Centre Block Flow Diagram (Reference: 9269-320-000 (Rev 2))*, 13 October 2015.

Summary of reasons for grade

Green Square Water has provided details in relation to the risk management measures (controls) that it will implement in respect of recycled water quality. It has also identified the critical control points (CCPs) and associated operational monitoring and critical limits that will be used to monitor performance of the multiple barrier treatment process that is to be implemented to achieve the pathogen log reduction values required to ensure that the water is compliant with the requirements of the *Australian Guidelines for Water Recycling* (AGWR).

Accordingly, Green Square Water is assessed to have demonstrated compliance with this obligation.

Discussion and notes

Overview:

Details of preventive measures and critical control points adopted in respect of the recycled water supply system are outlined in the *Recycled Water Quality Plan*,¹⁰⁰ which should be read in conjunction with the further detail provided in the *Scheme Management Plan*.¹⁰¹ Specific arrangements are discussed in the following.

Preventive measures and multiple barriers:

The *Recycled Water Quality Plan*¹⁰² indicates that:

“Management of the recycled water system is by a professional operations manager (Flow), which includes audits as required by Table 7.2 (high level of human contact) of the NSW Guidelines for Management of

¹⁰⁰ *Recycled Water Quality Plan*, section 4.

¹⁰¹ *Scheme Management Plan*, section 6.2.

¹⁰² *Recycled Water Quality Plan*, section 4.1.

Private Recycled Water Schemes (2008). This provides a foundation for effective control."

The *Recycled Water Quality Plan* further indicates that the Local Water Centre (recycled water treatment plant) incorporates multiple barriers in accordance with industry best practice for the production of recycled water. The target log reduction of pathogens from the proposed treatment train, which are identified in the *Plan*, exceeds that required under the *Australian Guidelines for Water Recycling (AGWR)*.

The treatment process train proposed for Green Square comprises inlet screening, disc filtration, ultrafiltration and chlorination,¹⁰³ with the ultrafiltration and chlorination processes providing the capacity for log reduction of pathogens (UV disinfection is not proposed for this scheme). Assessment of the log reduction requirements and detailed justification of the assumed log reduction values for each process is set out in the *Validation and Verification Report*.¹⁰⁴

Both the *Recycled Water Quality Plan*¹⁰⁵ and the *Scheme Management Plan*¹⁰⁶ reference the *Scheme Risk Register*¹⁰⁷ in respect of this obligation. As noted in Table B.2, review of the *Risk Register* reveals that an extensive range of hazardous events have been identified in respect of the recycled water system and an extensive range of controls/mitigation measures identified in respect of those events. Notwithstanding the identification and implementation of these controls, the residual risk remains very high or high for many of the potential hazardous events; however, the *Risk Register* indicates that:

"The high risk ensures that we focus on keeping the controls implemented".

Critical control points:

The *Recycled Water Quality Plan* indicates that:¹⁰⁸

"Each treatment process unit, activity or procedure relied upon to provide pathogen removal is considered a CCP. The controls, yet to be fully developed, are focused around the LWC processes for pathogen control. CCPs have been identified on the following processes and parameters:

- *Ultrafiltration (turbidity on combined effluent of membranes; and instantaneous flow rate at the permeate pumps)*
- *UV disinfection (instantaneous flow rate upstream of the UV reactor; UVT downstream of the UV reactor; and UVI within the UV reactor)*
- *Chlorine disinfection (free chlorine concentration downstream of the CCT, pH measures post MgOH dosing, but prior to the CCT; and instantaneous flow rate)."*

Critical control points (CCPs) for the Green Square scheme are identified in the *Scheme Management Plan*;¹⁰⁹ the following operational monitoring parameters with associated critical limits have been adopted:

- Ultrafiltration – turbidity;
- Ultrafiltration – pressure decay rate; and
- Chlorine disinfection – chlorine concentration and pH.

These CCPs, which are also identified and detailed in both the *Design Report*¹¹⁰ and *Validation and Verification Report*¹¹¹ and shown on the *Block Flow Diagram*,¹¹² are consistent with the arrangement outlined in the *Recycled Water Quality Plan* (again noting that UV disinfection is not proposed for this scheme).

¹⁰³ *Scheme Management Plan*, section 4.1.3.

¹⁰⁴ Flow/Green Square Water, *Validation and Verification Report; Stormwater Harvesting System (Version 2)*, 15 March 2017, section 7.1 (LRV requirements) and sections 10 and 11 (justification of assumed treatment LRVs).

¹⁰⁵ *Recycled Water Quality Plan*, section 4.1.

¹⁰⁶ *Scheme Management Plan*, section 6.2.1.

¹⁰⁷ Flow/Shepherds Bay Plus, *Shepherds Bay Risk Register*, 18 August 2017.

¹⁰⁸ *Recycled Water Quality Plan*, section 4.2.

¹⁰⁹ *Scheme Management Plan*, section 1.3 (table 2).

¹¹⁰ Flow, *Green Square – Local Water Centre – Treatment Plant; Design Report (Reference: 9269-E-R-211) (Issue No: 1)*, 9 October 2015, section 10.2.

¹¹¹ Flow/Green Square Water, *Validation and Verification Report; Stormwater Harvesting System (Version 2)*,

15 March 2017, section 12.

Critical limits for each CCP are identified; alert levels are identified in the *Critical Control Points Schedule*,¹¹³ an attachment to the *Validation and Verification Report*.

NSW Health Concerns:

In comments provided to IPART in respect of the audit scope, NSW Health raised several queries/concerns in relation to preventive measures and critical control points, as follows:^{114,115}

- *Ensure proposed treatment train meets end use requirements.*
- *Review CCPs and ensure CCP basis is clear and appropriate*
 - *Ultrafiltration CCP says 'Continuous – high turbidity alarm if two consecutive readings over critical limit 0.15 NTU for more than 15 mins' which does not make sense for continuous monitoring. No further detail.*
 - *The ultrafiltration CCP PDT says manually initiated with validation to 3 micron but elsewhere it says the ultrafiltration provides removal down to 0.1 micron absolute.*
 - *Green Square Critical Control Points plan is mentioned in Section 6.2.2 [of the Scheme Management Plan] for more info but this has not been provided and is not listed under Section 2.1.4 Supporting documents."*

The capacity of the proposed treatment train to meet end use requirements is discussed above. As noted, the capacity of the ultrafiltration and chlorination processes to achieve the required log reduction values is detailed in the *Validation and Verification Report*.

In response to the comments regarding the basis of the critical limits for the CCPs, Green Square Water has provided the following clarification:¹¹⁶

- **Ultrafiltration CCP – Turbidity:**

"This is the verification method described in USEPA Doc. EPA 815-R-06-009, MEMBRANE FILTRATION GUIDANCE MANUAL, under section CONTINUOUS INDIRECT INTEGRITY MONITORING, readings are to be taken every 15 mins and if two consecutive readings are not within spec a response is required. In reality, we do continuously monitor turbidity but do not register an off-spec condition until it is out of spec for greater than 15 minutes, which satisfies the USEPA MFGM requirement."
- **Ultrafiltration CCP – Pressure Decay Test:**

"The absolute pore size of the membranes is 0.1 micron the nominal pore size of the membranes is 0.04 micron.

Pressure Decay Test (PDT) is used to monitor the physical state of the membranes themselves. The sensitivity of the Pressure Decay Test (PDT) is such that it can verify if there is a hole in the membranes as small as 3 micron and greater. This is a requirement identified in the USEPA Doc. EPA 815-R-06-009, MEMBRANE FILTRATION GUIDANCE MANUAL for all membrane systems.

Therefore, the membranes filter down to 0.04 micron nominal and 0.1 absolute. If a hole forms in the membranes after installation that is greater than 3 micron, it will be detected by the PDT and corrective action is required."

Based on this clarification, it is apparent that the basis of the proposed ultrafiltration-related critical limits is appropriate; however, it is suggested that Green Square Water consider more clearly stating its intent in respect of these critical limits in the *Scheme Management Plan*. An opportunity for improvement (**OFI-GSW02**) has been identified in respect of this matter.

The reference to the *Green Square Water Critical Control Points* supporting document in section 6.2.2 of the *Scheme Management Plan* is understood to be a reference to the abovementioned *Critical Control Points*

¹¹² Flow, *Green Square Water; Local Water Centre Block Flow Diagram (Reference: 9269-320-000 (Rev 2))*, 13 October 2015.

¹¹³ Green Square Water, *Critical Control Points Schedule*, 3 March 2017 (included in Attachment E to the *Validation and Verification Report*).

¹¹⁴ Email dated 15 March 2017 from NSW Health to IPART (re: *Request for Comment - Audit Proposal - Licence Plans Audit*) [not provided to auditors until January 2018].

¹¹⁵ A further comment in relation to end uses has been addressed in Table B.2 and acknowledged in section 4.2.

¹¹⁶ Email dated 30 January 2018 from Flow/Green Square Water to Cobbitty Consulting (re: *NSW Health comments*).

Schedule, which is an attachment to the *Validation and Verification Report*. Neither the *Critical Control Points Schedule* or the *Validation and Verification Report* are identified as supporting documents in section 2.1.4 of the *Scheme Management Plan*; as an opportunity for improvement (**OFI-GSW03**), it is suggested that Green Square Water consider listing these documents.

Recommendations

There are no recommendations in respect of this obligation.

Opportunities for improvement

The following opportunities for improvement have been identified in respect of this obligation:

- **OFI-GSW02:** It is suggested that Green Square Water considers revising its *Scheme Management Plan* to more clearly state its intent in respect of the proposed ultrafiltration-related critical limits.
 - **OFI-GSW03:** It is suggested that Green Square Water considers including the *Critical Control Points Schedule* and the *Validation and Verification Report* as supporting documents in section 2.1.4 of the *Scheme Management Plan*.
-

Table B.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

- Interviews with Flow/Green Square Water personnel on 21 March 2017.
- Site inspections of infrastructure on 21 March 2017 and 27 September 2017.
- Green Square Water, *Scheme Management Plan (Scheme MP) (Revision 4)*, 29 January 2018.
- Flow Systems, *Recycled Water Quality Plan (RWQP) (Revision 8)*, 31 August 2017.
- Flow, *Infrastructure Operating Plan (IOP) (Revision 8)*, 21 December 2016.
- Flow, *Asset Management Plan (AMP) (Revision 2)*, 22 November 2016.
- ¹ Flow, *Green Square Town Centre Water Re-use Scheme: Operation and Maintenance Manual (Version 1)*, 15 September 2017 (table of contents only).
- Flow, *Green Square Water; Local Water Centre Block Flow Diagram (Reference: 9269-320-000 (Rev 2))*, 13 October 2015.
- Flow, *Monitoring and Sampling Plan (MSP) (Revision 6)*, 22 November 2016.
- Flow, *Green Square – Local Water Centre – Treatment Plant; Design Report (Reference: 9269-E-R-211) (Issue No: 1)*, 9 October 2015.
- Flow, *Green Square – Local Water Centre; Functional Brief (Reference: 9269-E-R-200) (Issue No: 1)*, 12 September 2016.

Summary of reasons for grade

Green Square Water has outlined its arrangements in relation to operational procedures, operational monitoring and process control in the *Recycled Water Quality Plan*, with additional detail presented in the *Infrastructure Operating Plan/Asset Management Plan* and the *Monitoring and Sampling Plan*. Although the *Operation and Maintenance Manual* for the Green Square scheme has not yet been fully documented, its proposed content has been described and is considered appropriate. Details of the assessment process in respect of chemical supply have also been documented.

Accordingly, Green Square Water 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 *Recycled Water Quality Plan*,¹¹⁷ which are also referenced in the *Scheme Management Plan*.¹¹⁸ Specific arrangements are discussed in the following.

¹¹⁷ *Recycled Water Quality Plan*, section 5.

Operational procedures:

The *Recycled Water Quality Plan*¹¹⁹ indicates that Flow/Green Square Water will develop an Operation and Maintenance Manual for each scheme prior to commencing commercial operation. This is consistent with information presented in the *Infrastructure Operating Plan*.¹²⁰ The *Recycled Water Quality Plan* also identifies the information that is to be incorporated into the Operation and Maintenance Manual, which includes:

- *“Overall process and site description*
- *Process description for each process step*
- *Process, mechanical and electrical drawings*
- *Equipment operation and process control, including set points and alarming*
- *Equipment maintenance schedule and guides, including daily, monthly, quarterly, half-yearly and yearly routine checklists*
- *Instrument calibration procedures and plan*
- *Troubleshooting procedures to identify process and/or equipment faults*
- *Safety information, including e-stops*
- *Supplier manuals and contact details*
- *Spare part requirements*
- *Material Safety Data Sheets (MSDSs).”*

This content, which is considered appropriate for the recycled water scheme, is consistent with information presented in the Operation and Maintenance Manuals sighted during previous audits of other Flow schemes (for example, the Central Park and Discovery Point recycled water schemes).

The *Recycled Water Quality Plan*¹²¹ references the Flow Business Management System (BMS) in respect of operational procedures. The BMS includes/provides linkages to “... *wide range of operational procedures covering operations, maintenance, asset management, sampling and analysis ...*” which are used to “...*support operations, control risks and ensure a high level of performance and compliance with legislative requirements.*”

It is noted that, as reported in Table A.1 and Table A.2, the scheme specific *Operation and Maintenance Manual*¹²² has not yet been fully documented; however, review of the table of contents indicates that it will address all relevant aspects and the intended arrangements are clear.

Operational monitoring:

The *Recycled Water Quality Plan*¹²³ indicates that:

“Operational monitoring is designed to be continuous to detect faults before the use of recycled water to assess whether preventive measures are effective as well as to evaluate usage trends. Operational monitoring consists of the following aspects:

- *Continuous online monitoring of key performance parameters, including ongoing review and interpretation of the results.*
- *Evaluation, comparison of the results as part of the verification process (refer to section 7 [of the RWQP]). This creates an overlap between verification and operational monitoring to ensure the results are correlated and any discrepancies identified and adjustments made in the continuous monitoring where required.”*

¹¹⁸ *Scheme Management Plan*, section 6 (table 7).

¹¹⁹ *Recycled Water Quality Plan*, section 5.1.

¹²⁰ *Infrastructure Operating Plan*, section 2.5.

¹²¹ *Recycled Water Quality Plan*, section 5.1.

¹²² Flow, *Green Square Town Centre Water Re-use Scheme: Operation and Maintenance Manual (Version 1)*, 15 September 2017 (table of contents only).

¹²³ *Recycled Water Quality Plan*, section 5.2.

Operational monitoring is undertaken principally in relation to critical control points (CCPs), but also includes appropriate quality control points (QCPs). Both CCPs and QCPs are identified on identified on the *Block Flow Diagram*.¹²⁴

The *Monitoring and Sampling Plan* outlines arrangements in respect of:¹²⁵

- Observational monitoring – which includes inspections and maintenance of drinking water infrastructure as outlined in the *Infrastructure Operating Plan*.
- Online monitoring – which includes monitoring of control parameters (centred around CCPs and QCPs) throughout the treatment process.

Operational corrections:

The *Recycled Water Quality Plan*¹²⁶ indicates that non-compliance with critical limits at critical control points (CCPs) will result in plant shutdown and cessation of recycled water production/supply to the recycled water treatment plant, this process being automatically controlled by the treatment plant PLC. Action is then taken by operators to identify and correct the cause of the non-compliance. This procedure is consistent with that observed during previous audits of other Flow recycled water schemes.

Arrangements for plant shutdown and the diversion of out-of-specification water to either the stormwater drainage system (post ultra-filtration) or the Sydney Water sewer (post chlorination) are documented in both the *Design Report*¹²⁷ and *Functional Brief*.¹²⁸ In the event of plant shutdown, treated water from the storage facilities is used until a trigger level is reached, following which potable water is supplied into the storage tank(s) via a potable top-up mechanism (which includes an air gap).

Green Square Water has incident response procedures in place that are to be implemented in the event that normal corrective actions cannot re-establish operational performance quickly enough to prevent recycled water of unacceptable quality from reaching consumers. These incident response procedures are discussed in further detail in Table B.6.

Equipment capability and maintenance:

The *Recycled Water Quality Plan*¹²⁹ notes the importance of the recycled water system equipment and infrastructure being adequately designed and sufficiently accurate and sensitive to perform in accordance with the specified requirements. It further notes that Local Water Centres (recycled water treatment plants) are designed by suitably qualified design consultants and that a technology assessment is undertaken for each plant to verify the treatment process and its ability to achieve the required pathogen log reduction values (refer to Table B.9 for further discussion).

Measures taken to ensure the ongoing capability of the equipment include (for example):

- Operation and performance of the treatment plant is controlled by PLC and a centralised SCADA system.
- Alternative power supplies are provided to the treatment plant, and provision is made for connection of an emergency generator.
- Key equipment is installed in a duty/standby configuration, with automatic changeover initiated via the control system in the event of component failure.
- Routine checking/calibration of key process monitoring instrumentation by both operators (using hand-held instruments) and external service providers.

Arrangements in relation to maintenance of the infrastructure are detailed in the *Infrastructure Operating*

¹²⁴ Flow, *Green Square Water; Local Water Centre Block Flow Diagram (Reference: 9269-320-000 (Rev 2))*, 13 October 2015.

¹²⁵ *Monitoring and Sampling Plan*, section 6.2.

¹²⁶ *Recycled Water Quality Plan*, section 5.3.

¹²⁷ Flow, *Green Square – Local Water Centre – Treatment Plant; Design Report (Reference: 9269-E-R-211) (Issue No: 1)*, 9 October 2015.

¹²⁸ Flow, *Green Square – Local Water Centre; Functional Brief (Reference: 9269-E-R-200) (Issue No: 1)*, 12 September 2016.

¹²⁹ *Recycled Water Quality Plan*, section 5.4.

Plan and more specifically the *Asset Management Plan*. The *Asset Management Plan* outlines the arrangements in relation to Preventive Maintenance¹³⁰ and Breakdown/Defect Maintenance.¹³¹ Maintenance activities are managed through a Computerised Maintenance Management System (CMMS), through which Work Orders for all maintenance activities are to be issued.

The Asset Management Plan also outlines arrangements in relation to asset condition and risk assessment, which provides the basis for ensuring the capability of the infrastructure.

Materials and chemicals:

Flow/Flow Systems Operations relies on guidance documents provided by external parties in relation to material quality, including:

- *Plumbing Code of Australia* (Volume 3 of the *National Construction Code*);
- *WSAA Water Supply Code of Australia* (WSA 03); and
- *AS/NZS 3500 Plumbing and Drainage Set*.

This guidance is considered appropriate.

The *Recycled Water Quality Plan*¹³² identifies chemicals used in the recycled water treatment process. It also indicates that chemicals are sourced from reputable suppliers and outlines key aspects considered when evaluating potential chemical suppliers. These assessment criteria are 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.

¹³⁰ *Asset Management Plan*, section 5.4.

¹³¹ *Asset Management Plan*, section 5.5.

¹³² *Recycled Water Quality Plan*, section 5.5.

Table B.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 Flow/Green Square Water personnel on 21 March 2017.
- Site inspections of infrastructure on 21 March 2017 and 27 September 2017.
- Green Square Water, *Scheme Management Plan (Scheme MP) (Revision 4)*, 29 January 2018.
- Flow Systems, *Recycled Water Quality Plan (RWQP) (Revision 8)*, 31 August 2017.
- Flow, *Monitoring and Sampling Plan (MSP) (Revision 6)*, 22 November 2016.
- Flow, *Incident Management Plan (IMP) (Revision 6)*, 14 October 2016.
- Flow/Green Square Water, *Validation and Verification Report; Stormwater Harvesting System (Version 2)*, 15 March 2017.
- Flow, *Incident Notification Protocol with NSW Health for Supply of Drinking Water and Supply of Recycled Water (Revision 2)* 15 January 2015.
- Flow, *Customer Complaints* (Code of Practice), undated, available at: <https://flowsystems.com.au/governance/CustomerComplaints.pdf>.
- Flow, *Customer Complaint Process* (Flow Charts), undated.
- Flow website contact page at: <https://flowsystems.com.au/contact/>.

Summary of reasons for grade

Green Square Water 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, Green Square Water 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 *Recycled Water Quality Plan*,¹³³ which is also referenced in the *Scheme Management Plan*.¹³⁴ 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 *Monitoring and Sampling Plan*.¹³⁵ This outlines an Intensive Verification Monitoring Plan to be implemented during the first eight weeks of operation and an Ongoing Verification Monitoring Plan to be implemented thereafter. Verification monitoring as implemented by Flow comprises a combination of online and grab sample

¹³³ *Recycled Water Quality Plan*, section 6.

¹³⁴ *Scheme Management Plan*, section 6 (table 7).

¹³⁵ *Monitoring and Sampling Plan*, section 6.3.

monitoring.

More specific details of the monitoring required for verification purposes are documented in the *Validation and Verification Report*.¹³⁶

The *Monitoring and Sampling Plan*¹³⁷ notes that customer complaints will be recorded as part of the verification monitoring plan, thereby enabling the long-term analysis of system performance.

Corrective actions or emergency responses are implemented in the event of any deviations identified due to verification monitoring. Such action is taken in accordance with the *Incident Management Plan* and *Incident Notification Protocol*,¹³⁸ where applicable (refer Table B.6 for further discussion).

Application site and receiving environment monitoring:

The *Recycled Water Quality Plan*¹³⁹ outlines the parameters that will be monitored in relation to any receiving environments. Monitoring locations and frequencies are documented in a Water Quality Verification and Monitoring Plan (assumed to be the *Validation and Verification Report* for the purposes of this scheme). No direct receiving environment monitoring (e.g. of soils or water in water features) has been identified for irrigated areas and water features. Rather, monitoring covers parameters that might influence the receiving environment that are measured in the final water quality against specifications. Such direct monitoring of receiving environments, such as soils and receiving waters, might be expected for recycled water derived from sewage due to possible elevation in levels of salts and nutrients that might impact some plants and soils or trigger algal blooms in water features. However, for a stormwater recycling scheme, dedicated receiving environment monitoring for irrigation areas and water features, beyond any normal assessment that would be undertaken if potable water or rainwater were in use, is not considered necessary.

Documentation and reliability:

The *Recycled Water Quality Plan*¹⁴⁰ refers to a Water Quality Verification and Monitoring Plan (assumed to be the *Validation and Verification Report* for the purposes of this scheme), which documents a sampling plan for each characteristic, including the location and frequency of sampling, ensuring that monitoring data is representative and reliable. A work instruction *How to take a Recycled Water Sample* (also referenced in the *Monitoring and Sampling Plan*)¹⁴¹ forms part of the Flow Business Management System.

Review of the *Validation and Verification Report*¹⁴² confirms that it details the arrangements in relation sampling and monitoring for each characteristic.

Satisfaction of users of recycled water:

Flow, which is the licensed Retail Supplier for the Green Square scheme, enters details of its customers into the Customer Relationship Management System (CRMS) as they are set up, i.e. when they purchase properties within the development. The CRMS is then used to manage records of customer complaints (should they arise) and responses in accordance with *Customer Complaint Policy*¹⁴³ and *Customer Compliant Process Flow Charts*¹⁴⁴ (which has been discussed in detail during previous audits of Flow schemes).

Customer complaints can be made via telephone, email or online, with details available on the Flow¹⁴⁵ and its subsidiary websites. Flow has set itself internal targets for ensuring that customer complaint resolution is

¹³⁶ Flow/Green Square Water, *Validation and Verification Report; Stormwater Harvesting System (Version 2)*, 15 March 2017, section 13 and attachment E.

¹³⁷ *Monitoring and Sampling Plan*, section 6.3.2.1.

¹³⁸ Flow, *Incident Notification Protocol with NSW Health for Supply of Drinking Water and Supply of Recycled Water (Revision 2)*, 15 January 2015.

¹³⁹ *Recycled Water Quality Plan*, section 6.2.

¹⁴⁰ *Recycled Water Quality Plan*, section 6.3.

¹⁴¹ *Monitoring and Sampling Plan*, section 8.

¹⁴² Flow/Green Square Water, *Validation and Verification Report; Stormwater Harvesting System (Version 2)*, 15 March 2017, section 13 and attachment E.

¹⁴³ Flow, *Customer Complaints* (Code of Practice), undated, available at: <https://flowsystems.com.au/governance/CustomerComplaints.pdf>.

¹⁴⁴ Flow, *Customer Complaint Process* (Flow Charts), undated.

¹⁴⁵ Flow website contact page at: <https://flowsystems.com.au/contact/>.

both prompt and appropriate; these targets, which are considered appropriate, are documented in the *Recycled Water Quality Plan*¹⁴⁶ (in part) and *Customer Complaint Policy*.

The *Customer Complaint Policy* clearly documents the process adopted by Flow in relation to the management of customer complaints.

Short-term evaluation of results:

The *Recycled Water Quality Plan*¹⁴⁷ refers to section 12 of the Plan (Documentation and Reporting) for details in respect of the short-term evaluation of results (refer Table B.11 for discussion). It further indicates that performance reporting in respect of water quality targets is available on the Flow website.

It is noted that, although not specifically identified in the relevant section of the *Recycled Water Quality Plan*, short-term monitoring and evaluation of results is undertaken continuously via the SCADA system, which is in turn monitored by operational staff at least daily or in response to alert/alarm conditions.

Corrective responses:

The *Recycled Water Quality Plan*¹⁴⁸ indicates that:

“In the event that any deviations are identified in the verification results, immediate corrective actions or emergency response procedures are implemented.”

Arrangements in respect of incident and emergency response are discussed in Table B.6.

The *Recycled Water Quality Plan* further notes that:

“As a minimum, the plant records and trends are evaluated to confirm normal operation and identify any possible deviations. All the findings are clearly reported and if required, the RWQP and/or Scheme Management Plan updated to include the findings.”

This indicates that, where appropriate, corrective actions having longer term or wider ranging implications are captured in the management system documentation, thereby supporting a process of continual improvement.

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.

¹⁴⁶ *Recycled Water Quality Plan*, section 6.4.

¹⁴⁷ *Recycled Water Quality Plan*, section 6.5.

¹⁴⁸ *Recycled Water Quality Plan*, section 6.6.

Table B.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.	Compliant

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

- Interviews with Flow/Green Square Water personnel on 21 March 2017.
- Site inspections of infrastructure on 21 March 2017 and 27 September 2017.
- Green Square Water, *Scheme Management Plan (Scheme MP) (Revision 4)*, 29 January 2018.
- Flow Systems, *Recycled Water Quality Plan (RWQP) (Revision 8)*, 31 August 2017.
- Flow, *Incident Management Plan (IMP) (Revision 6)*, 14 October 2016.
- Flow, *Incident Notification Protocol with NSW Health for Supply of Drinking Water and Supply of Recycled Water (Revision 2)*, 15 January 2015.
- Green Square Water, *Incident Notification Forms A and B (Reference: GS-WAT-AUS-FM-1813-0)*.
- Flow, *Emergency Contact List*, 11 September 2017.
- Flow, *Customer Complaints (Code of Practice)*, undated, available at: <https://flowsystems.com.au/governance/CustomerComplaints.pdf>.

Summary of reasons for grade

Green Square Water has developed an approach to the management of incidents and emergencies, which is documented in the *Recycled Water Quality Plan* and the *Incident Management Plan*. It also has communication protocols in place with both NSW Health and the City of Sydney (although principally as a recipient of notifications of pollution incidents). Accordingly, Green Square Water is assessed to have demonstrated compliance with this obligation.

Discussion and notes

Overview:

Details of the arrangements for the management of incidents and emergencies are outlined in the *Recycled Water Quality Plan*,¹⁴⁹ which is also referenced in the *Scheme Management Plan*.¹⁵⁰ The response to incidents and emergencies is managed in accordance with the *Incident Management Plan*, which provides guidance in relation to risk management; incident response; incident classification and management; incident notification; incident management responsibilities; incident termination and investigation; incident recovery; and incident preparedness.

The *Recycled Water Quality Plan*¹⁵¹ indicates that Flow has defined potential incidents and emergencies and has documented response plans to respond to certain events. These include both matters related to recycled water quality and broader matters, such as:

¹⁴⁹ *Recycled Water Quality Plan*, section 7.

¹⁵⁰ *Scheme Management Plan*, section 6 (table 7).

¹⁵¹ *Recycled Water Quality Plan*, section 7.2.

-
- failure/breakage of the pressure main resulting in contamination;
 - equipment failure;
 - fire, disrupting operation of the drinking water infrastructure;
 - power failure, disrupting operation of the drinking water infrastructure;
 - vandalism/sabotage, disrupting operation of the recycled water infrastructure;
 - flood, disrupting the operation of the drinking water infrastructure;
 - cross connection of recycled water into the drinking water network; and
 - customer complaint.

Specific arrangements are discussed in the following.

Communication:

Green Square Water has in place an *Incident Notification Protocol*,¹⁵² which details the protocol for notifying and communicating with NSW Health and other stakeholders in the event of incident or emergency. The *Protocol* includes Forms A (Incident Initial Notification) and B (Incident Written Notification),¹⁵³ which are to be used for notification purposes. Green Square Water provided evidence¹⁵⁴ that the *Protocol* had been submitted to NSW Health; however, advised that no comments have been received.

Flow/Green Square Water has also developed and *Emergency Contacts List*,¹⁵⁵ which provides an up-to-date listing of contacts relevant to all of Flow's schemes.

It is noted that, as reported in Table B.2, Green Square Water is to be a party to the City of Sydney's communication protocol in respect of water quality incident notification in stormwater catchments. Whilst Green Square Water will generally be a recipient of notifications under this protocol, it is important that this arrangement be in place.

Incident and emergency response protocols:

As noted above, protocols in place in relation to incident and emergency response include the *Incident Management Plan* and the *Incident Notification Protocol* with NSW Health. These protocols provide appropriate guidance in relation to response management and communication.

Flow/Green Square Water also demonstrated that, in responding to problems identified by customers, it will implement response processes outlined in its *Customer Complaint Policy*;¹⁵⁶ these appeared to be adequate to raise an issue to incident status where required.

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.

¹⁵² Flow, *Incident Notification Protocol with NSW Health for Supply of Drinking Water and Supply of Recycled Water (Revision 2)*, 15 January 2015.

¹⁵³ Green Square Water, *Incident Notification Forms A and B (Reference: GS-WAT-AUS-FM-1813-0)*.

¹⁵⁴ For example: Email dated 7 October 2014 (and follow-up emails dated 20 October 2014 and 14 November 2014) from Flow to NSW Health (re: *DRAFT Incident Notification Protocol with NSW Health and Public Health Units*).

¹⁵⁵ Flow, *Emergency Contact List*, 11 September 2017.

¹⁵⁶ Flow, *Customer Complaints (Code of Practice)*, undated, available at: <https://flowsystems.com.au/governance/CustomerComplaints.pdf>.

Table B.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

- Interviews with Flow/Green Square Water personnel on 21 March 2017.
- Site inspections of infrastructure on 21 March 2017 and 27 September 2017.
- Green Square Water, *Scheme Management Plan (Scheme MP) (Revision 4)*, 29 January 2018.
- Flow Systems, *Recycled Water Quality Plan (RWQP) (Revision 8)*, 31 August 2017.

Summary of reasons for grade

The *Recycled Water Quality Plan* outlines the arrangements in respect of operator, contractor and end user training and awareness. Observations made during this and previous audits of Flow schemes indicate that those arrangements are effectively implemented.

On that basis, Green Square Water is assessed to have demonstrated compliance with this obligation.

Discussion and notes

Overview:

Details of the arrangements in respect of employee training and awareness are outlined in the *Recycled Water Quality Plan*,¹⁵⁷ which is also referenced in the *Scheme Management Plan*.¹⁵⁸

As reported in Table A.1 and Table A.2, the Executive Manager Operations will be principally responsible for management (operation and maintenance) of the infrastructure, and will be supported in this role by the Manager Network Operations, Scheme Operator, other Flow Systems staff and external service providers. As also reported, these key staff and supporting staff have appropriate skills and ample experience to undertake their roles.

More specific arrangements in relation to training and awareness are discussed in the following.

Operator, contractor and end user awareness and involvement:

The *Recycled Water Quality Plan*¹⁵⁹ indicates that key stakeholders in relation to awareness and training fall into four main groups including management of the scheme; operators; contractors who provide support services; and customers (end users of the treated water). It also outlines the specific awareness and training arrangements that are applicable to each group.

Review of the training and awareness program as outlined in the *Recycled Water Quality Plan*¹⁶⁰ reveals that it is both comprehensive and for the purposes of recycled water quality management.

Operator, contractor and end user training:

As noted above, the *Recycled Water Quality Plan*¹⁶¹ outlines the specific awareness and training

¹⁵⁷ *Recycled Water Quality Plan*, section 8.

¹⁵⁸ *Scheme Management Plan*, section 6 (table 7).

¹⁵⁹ *Recycled Water Quality Plan*, section 8.1.

¹⁶⁰ *Recycled Water Quality Plan*, section 8.1 (table 10).

arrangements that are applicable to each stakeholder group.

It is the responsibility of the Executive Manager Operations to ensure that employees are appropriately skilled and trained in the management and operation of the recycled water supply system, including the treatment plant. This is achieved through a regular review process, which aims to ensure that individual employees and contractors maintain the appropriate qualifications and experience.

Review of training documentation and records during previous audits of Flow schemes has revealed that relevant training is implemented and recorded.

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.

¹⁶¹ *Recycled Water Quality Plan*, section 8.2.

Table B.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

- Interviews with Flow/Green Square Water personnel on 21 March 2017.
- Site inspections of infrastructure on 21 March 2017 and 27 September 2017.
- Green Square Water, *Scheme Management Plan (Scheme MP) (Revision 4)*, 29 January 2018.
- Flow Systems, *Recycled Water Quality Plan (RWQP) (Revision 8)*, 31 August 2017.
- Green Square Water website at: <https://flowsystems.com.au/communities/green-square-water/>.
- Flow Systems, *Customer Contract*, 30 October 2015 (<http://flowsystems.com.au/governance/CustomerContract.pdf>).
- Flow Systems, *Customer Contract*, 30 October 2015, available at <http://flowsystems.com.au/governance/CustomerContract.pdf>.
- Flow, *Homeowner's Guide*, December 2016, available at: https://flowsystems.com.au/askus/Land Housing/Home_Owners_Guide.pdf.
- Flow, *Customer Complaints* (Code of Practice), undated, available at: <https://flowsystems.com.au/governance/CustomerComplaints.pdf>.
- Flow, *Plumber's Guide*, May 2016.
- Flow, *Builder's Guide*, May 2016.

Summary of reasons for grade

Green Square Water has sufficiently documented its process for community awareness and involvement in the *Recycled Water Quality Plan*. These processes, which are principally reliant on web-based mechanisms for both communication and feedback, are considered appropriate.

Accordingly, Green Square Water is assessed to have demonstrated compliance with this obligation.

Discussion and notes

Overview:

Details of the process for community consultation, awareness and involvement are outlined in the *Recycled Water Quality Plan*,¹⁶² which is also referenced in the *Scheme Management Plan*.¹⁶³ More specific arrangements are discussed in the following.

Consultation with users of recycled water and the community:

The *Recycled Water Quality Plan*¹⁶⁴ indicates that Flow/Green Square Water employs the following key strategies to ensure the continued effective involvement of the community and end-users (customers):

¹⁶² *Recycled Water Quality Plan*, section 9.

¹⁶³ *Scheme Management Plan*, section 6 (table 7).

-
- Web-based updates;
 - Various options for customers to provide feedback or to record complaints, encouraging feedback;
 - ‘Town’ meetings as an opportunity to give feedback and openly discuss any concerns/issues; and
 - Community based education and training sessions, including controlled site visits of the Local Water Centre (recycled water treatment plant).

Flow/Green Square Water has a specific website specific to the Green Square scheme.¹⁶⁵ In addition, general information and feedback mechanisms are available via the Flow website. These include extensive information in respect of recycled water and its management as well as documents such as the *Customer Contract*,¹⁶⁶ *Homeowners Guide*¹⁶⁷ and *Customer Complaint Policy*.¹⁶⁸

These arrangements are considered appropriate.

Communication and education:

The *Recycled Water Quality Plan*¹⁶⁹ references the scheme specific website and customer communications via email updates as mechanism for communicating with the community and its customers. As noted above, Flow/Green Square Water has posted a website specific to the Green Square scheme. General information in relation to Flow schemes is available on the Flow website, which also indicates that:

- information packages, which identify authorised uses, restrictions and user responsibilities, are provided to all customers; and
- information is available to tradespersons in the *Plumbers Guide*¹⁷⁰ and *Builders Guide*.¹⁷¹

These arrangements are again 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.

¹⁶⁴ *Recycled Water Quality Plan*, section 9.1.

¹⁶⁵ Green Square Water website at: <https://flowsystems.com.au/communities/green-square-water/>.

¹⁶⁶ Flow Systems, *Customer Contract*, 30 October 2015, available at <http://flowsystems.com.au/governance/CustomerContract.pdf>.

¹⁶⁷ Flow, *Homeowner’s Guide*, December 2016, available at: https://flowsystems.com.au/askus/Land_Housing/Home_Owners_Guide.pdf.

¹⁶⁸ Flow, *Customer Complaints* (Code of Practice), undated, available at: <https://flowsystems.com.au/governance/CustomerComplaints.pdf>.

¹⁶⁹ *Recycled Water Quality Plan*, section 9.2.

¹⁷⁰ Flow, *Plumber’s Guide*, May 2016.

¹⁷¹ Flow, *Builder’s Guide*, May 2016.

Table B.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.	Compliant

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 Flow/Green Square Water personnel on 21 March 2017.
- Site inspections of infrastructure on 21 March 2017 and 27 September 2017.
- Green Square Water, *Scheme Management Plan (Scheme MP) (Revision 4)*, 29 January 2018.
- Flow Systems, *Recycled Water Quality Plan (RWQP) (Revision 8)*, 31 August 2017.
- Flow, *Monitoring and Sampling Plan (MSP) (Revision 6)*, 22 November 2016.
- Water Futures, *WICA Technology Assessment Report – Green Square*, 24 March 2017.
- Flow, *Green Square – Local Water Centre – Treatment Plant; Design Report (Reference: 9269-E-R-211) (Issue No: 1)*, 9 October 2015.
- Flow/Green Square Water, *Validation and Verification Report; Stormwater Harvesting System (Version 2)*, 15 March 2017.

Summary of reasons for grade

Green Square Water has outlined its approach in relation to its validation of processes in the *Recycled 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 and Verification Report.

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

Accordingly, Green Square Water is assessed to have demonstrated compliance with this obligation.

Discussion and notes

Overview:

Details of the validation processes for the scheme are outlined in the *Recycled Water Quality Plan*,¹⁷² which is also referenced in the *Scheme Management Plan*.¹⁷³ Specific arrangements are discussed in the following.

Validation of processes:

The *Recycled Water Quality Plan*¹⁷⁴ outlines Flow/GSW’s approach to validation of its treatment processes, which includes:

- Offsite validation – which involves assessment of the effectiveness of proposed MBR and UV disinfection processes and chlorine disinfection CT calculations. A technology assessment based on supplier provided validation information is undertaken (in accordance with WIC Act Audit Guidelines)

¹⁷² *Recycled Water Quality Plan*, section 10.

¹⁷³ *Scheme Management Plan*, section 6 (table 7).

¹⁷⁴ *Recycled Water Quality Plan*, section 10.1.

to assess the appropriateness and adequacy of selected the technology.

- Onsite validation – undertaken during the start-up of the scheme, this involves four weeks of focused online sampling to verify the validation information used in the selection of the technologies (effectively more regular verification monitoring, which is used for validation purposes.)

The *Monitoring and Sampling Plan*¹⁷⁵ further details the arrangements in respect of both desktop (offsite) and practical (onsite) validation. It details the multiple barrier approach adopted to achieve the required pathogen log reduction values and the basis for validation of the MBR, UV disinfection and Chlorine disinfection processes.

The *Validation and Verification Report*¹⁷⁶ outlines in detail the validation of the suitability of the adopted treatment processes for the Green Square scheme. It also outlines a verification process for confirming that the treatment plant functions in accordance with its design intent.

Flow typically engages an auditor to undertake a technology assessment in respect of each of its schemes. The technology assessment for the Green Square recycled water scheme is documented in the *Technology Assessment Report*,¹⁷⁷ which confirmed that the proposed process arrangements are appropriate for the scheme. Some inconsistencies between claimed log reduction values (LRVs), as documented in the *Design Report*,¹⁷⁸ and those determined by the Technology Assessment were identified, although total log reduction credits were found to be adequate. These inconsistencies have been addressed in the *Validation and Verification Report*,¹⁷⁹ in which the claimed log reduction values have been revised.

Critical limits for the adopted critical control points (CCPs) are documented in both the *Design Report*¹⁸⁰ and the *Validation and Verification Report*,¹⁸¹ although there are variances between the values presented in each document. Green Square Water has confirmed that adopted values are those presented in the *Validation and Verification Report*.

Alert and critical limits are also identified on the *Critical Control Points Schedule*,¹⁸² an attachment to the *Validation and Verification Report*, which also provides a description of the test, the location at which it is monitored and details of the corrective action/shutdown process; this is taken as the definitive source.

Design of equipment:

As reported in Table B.4, Local Water Centres (recycled water treatment plants) are designed by suitably qualified design consultants. Distribution/reticulation pipework is designed in accordance with relevant industry standards including:

- *Plumbing Code of Australia* (Volume 3 of the *National Construction Code*);
- *WSAA Water Supply Code of Australia* (WSA 03); and
- *AS/NZS 3500 Plumbing and Drainage Set*.

Investigative studies and research monitoring:

The *Recycled Water Quality Plan*¹⁸³ indicates that Flow/Green Square Water will review the data obtained as a result of validation and verification monitoring of system performance to continually increase its understanding of the system and as the basis of any improvement initiatives.

¹⁷⁵ *Monitoring and Sampling Plan*, section 6.1.

¹⁷⁶ Flow/Green Square Water, *Validation and Verification Report; Stormwater Harvesting System (Version 2)*, 15 March 2017.

¹⁷⁷ Water Futures, *WICA Technology Assessment Report – Green Square*, 24 March 2017.

¹⁷⁸ Flow, *Green Square – Local Water Centre – Treatment Plant; Design Report (Reference: 9269-E-R-211) (Issue No: 1)*, 9 October 2015, section 6.3.

¹⁷⁹ Flow/Green Square Water, *Validation and Verification Report; Stormwater Harvesting System (Version 2)*, 15 March 2017, section 7.1.

¹⁸⁰ Flow, *Green Square – Local Water Centre – Treatment Plant; Design Report (Reference: 9269-E-R-211) (Issue No: 1)*, 9 October 2015, section 10.2.

¹⁸¹ Flow/Green Square Water, *Validation and Verification Report; Stormwater Harvesting System (Version 2)*, 15 March 2017, section 12.

¹⁸² Green Square Water, *Critical Control Points Schedule*, 3 March 2017 (included in Attachment E to the *Validation and Verification Report*).

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.

¹⁸³ *Recycled Water Quality Plan, section 10.3.*

Table B.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.	Compliant

Risk

Target for Full Compliance

Inadequate documentation, records and reporting presents a risk of poor management of the recycled water supply scheme.

Adequate documentation, records and reporting.

Evidence sighted

- Interviews with Flow/Green Square Water personnel on 21 March 2017.
- Site inspections of infrastructure on 21 March 2017 and 27 September 2017.
- Green Square Water, *Scheme Management Plan (Scheme MP) (Revision 4)*, 29 January 2018.
- Flow Systems, *Recycled Water Quality Plan (RWQP) (Revision 8)*, 31 August 2017.
- Flow, *Records Management Policy (Revision 1)*, 17 July 2015.
- Flow, *Document Control Procedure (Revision 3)*, 3 February 2016.
- Flow, *Compliance Management Policy and Procedure (Revision 3)*, 29 August 2017.
- Flow, *Compliance Register*, updated 7 September 2017.

Summary of reasons for grade

Green Square Water has detailed its processes for the management of documentation and records and complying with reporting requirements in the *Recycled Water Quality Plan*. These processes are managed by Flow at a corporate level through implementation of policies and procedures that form part of its Business Management System.

Accordingly, Green Square Water is assessed to have demonstrated compliance with this obligation.

Discussion and notes

Overview:

Details of processes for the management of documentation and records and complying with reporting requirements are outlined in the *Recycled Water Quality Plan*,¹⁸⁴ which is also referenced in the *Scheme Management Plan*.¹⁸⁵ Specific arrangements are discussed in the following.

Management of documentation and records:

Flow has documented and implements the *Records Management Policy*¹⁸⁶ as part of its Business Management System. It also has in place a corporate *Document Control Procedure*,¹⁸⁷ which also forms part of the Business Management System. Current documents are retained on the intranet, through which document control mechanisms are also implemented.

Flow’s approach to document and records management has been reviewed during previous audits of Flow

¹⁸⁴ *Recycled Water Quality Plan*, section 11.

¹⁸⁵ *Scheme Management Plan*, section 6 (table 7).

¹⁸⁶ Flow, *Records Management Policy (Revision 1)*, 17 July 2015.

¹⁸⁷ Flow, *Document Control Procedure (Revision 3)*, 3 February 2016.

schemes and found to be both adequate and effective.

The *Recycled Water Quality Plan*¹⁸⁸ also details the arrangements for management of operational data. All key critical control point (CCP) data is stored and is available for access via the SCADA system. Collation of key data on a summary page enables ready review of system performance at any time. Data is trended against design/expected performance, thereby enabling the ready identification of any deviations and a proactive response in the case that deviations are observed.

The SCADA system can be accessed remotely, thereby increasing accessibility and enabling rapid response to alert or alarm conditions.

Reporting:

Reporting requirements are identified in the *Recycled Water Quality Plan*.¹⁸⁹ These include:

- Internal reporting for operational purposes;
- Internal reporting for management purposes; and
- External reporting to customers, local government authorities, health authorities and IPART.

Reporting requirements are managed in part through implementation of the *Compliance Management Policy and Procedure*,¹⁹⁰ with compliance requirements identified (at a high level) in the *Compliance Register*.¹⁹¹ A useful summary table identifies the key monthly, annual and event-related reporting requirements and summarises those correctly.

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.

¹⁸⁸ *Recycled Water Quality Plan*, section 11.1.

¹⁸⁹ *Recycled Water Quality Plan*, section 11.2.

¹⁹⁰ Flow, *Compliance Management Policy and Procedure (Revision 3)*, 29 August 2017.

¹⁹¹ Flow, *Compliance Register*, updated 7 September 2017.

Table B.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 Flow/Green Square Water personnel on 21 March 2017.▪ Site inspections of infrastructure on 21 March 2017 and 27 September 2017.▪ Green Square Water, <i>Scheme Management Plan (Scheme MP) (Revision 4)</i>, 29 January 2018.▪ Flow Systems, <i>Recycled Water Quality Plan (RWQP) (Revision 8)</i>, 31 August 2017.▪ Flow, <i>Audit Procedure (Revision 1)</i>, 15 July 2015.		
Summary of reasons for grade		
<p>The <i>Recycled Water Quality Plan</i> outlines the process for the long-term evaluation of results and audit of the <i>Plan</i>. An <i>Audit Procedure</i> provides more specific detail of the audit process, addressing both internal and external audits.</p> <p>Accordingly, Green Square Water 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>Recycled Water Quality Plan</i> are outlined in the <i>Recycled Water Quality Plan</i>,¹⁹² which is also referenced in the <i>Scheme Management Plan</i>.¹⁹³ Specific arrangements are discussed in the following.</p>		
Long-term evaluation of results:		
<p>The <i>Recycled Water Quality Plan</i>¹⁹⁴ indicates that systematic review of monitoring results over an extended period, typically 12 months or longer, is undertaken to assess overall performance against water quality objectives, identify any emerging problems and plan maintenance and/or identify process improvements. It further indicates that Flow/Green Square Water will:</p>		
<ul style="list-style-type: none">▪ monitor the treatment plant to proactively identify problems, thereby ensuring the long-term performance of the treatment system; and▪ once per year, review operational details including:<ul style="list-style-type: none">○ key performance data trends;○ a summary of incidents, causes and remediation actions; and○ any changes to the plant which may require update of the <i>Recycled Water Quality Plan</i>.		

¹⁹² *Recycled Water Quality Plan*, section 12.

¹⁹³ *Scheme Management Plan*, section 6 (table 7).

¹⁹⁴ *Recycled Water Quality Plan*, section 12.1.

Audit of recycled water quality management:

The *Recycled Water Quality Plan*¹⁹⁵ indicates that Flow/Green Square Water will conduct internal audits, and will document and communicate audit results in accordance with the *Audit Procedure*¹⁹⁶ that form part of the Flow Business Management System. The *Audit Procedure* also outlines external audits undertaken in respect of Flow and its subsidiaries, which include:

- WICA audits, which provide a key review opportunity; and
- annual audit of Flow's management systems, which are certified to ISO 9001, ISO 14001, OSHAS 18001 and AS 4801, by an independent accredited certifying body.

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.

¹⁹⁵ *Recycled Water Quality Plan*, section 12.2.

¹⁹⁶ Flow, *Audit Procedure (Revision 1)*, 15 July 2015.

Table B.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

- Interviews with Flow/Green Square Water personnel on 21 March 2017.
- Site inspections of infrastructure on 21 March 2017 and 27 September 2017.
- Green Square Water, *Scheme Management Plan (Scheme MP) (Revision 4)*, 29 January 2018.
- Flow Systems, *Recycled Water Quality Plan (RWQP) (Revision 8)*, 31 August 2017.

Summary of reasons for grade

The *Recycled Water Quality Plan* 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.

Accordingly, Green Square Water is assessed to have demonstrated compliance with this obligation.

Discussion and notes

Overview:

Details of processes for review and continual improvement are outlined in the *Recycled Water Quality Plan*,¹⁹⁷ which is also referenced in the *Scheme Management Plan*.¹⁹⁸ Specific arrangements are discussed in the following.

Review by senior managers:

The *Recycled Water Quality Plan*¹⁹⁹ indicates that the Flow Executive Management Team will maintain oversight of the effectiveness of the recycled water quality management system and evaluate needs for change in accordance with the requirements of the *Management Review Procedure* (not sighted), which forms part of the Flow Business Management System. Management reviews are to be conducted annually as a minimum, and will include a review of audit reports; recycled water quality performance; environmental performance; previous management reviews; and concerns identified by users of recycled water, regulators and other stakeholders.

Recycled water quality management improvement plan:

The *Recycled Water Quality Plan*²⁰⁰ indicates that recycled water quality improvements will be managed in accordance with the *Continual Improvement Procedure* (not sighted), which also forms part of the Business Management System and its Implementation Plan.

The *Recycled Water Quality Plan* also indicates the types of improvements that could potentially be implemented; these include (for example) capital works; enhanced operational procedures; and training. It further notes that corrective actions identified as a result of audit (internal or external) will be addressed as

¹⁹⁷ *Recycled Water Quality Plan*, section 13.

¹⁹⁸ *Scheme Management Plan*, section 6 (table 7).

¹⁹⁹ *Recycled Water Quality Plan*, section 13.1.

²⁰⁰ *Recycled Water Quality Plan*, section 13.2.

part of its improvement plan.

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.
