

COMPLIANCE AND PERFORMANCE REPORT

SEPTEMBER 2019





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EXECUTIVE SUMMARY

Hunter Water is dedicated to providing safe, reliable and efficient water and wastewater services to households and businesses in the Lower Hunter. Our Operating Licence sets out the terms and quality expectations that govern our delivery of those services to the community. This report provides information on our performance for 2018-19 against the requirements of our Operating Licence and Operating Licence Reporting Manual.

Quality, safety and reliability are of critical importance to us. As a State Owned Corporation we strive to deliver these outcomes efficiently and with due regard to community and environmental values.

We have performed at a consistent, high standard through 2018-19 and are undertaking programs in 2019-20 to continue to deliver this performance. Key performance and operational outcomes during 2018-19 include:

Supply services and performance standards

- Full conformance with the Drinking Water Quality Management System (DWQMS);
- Full conformance with the Recycled Water Quality Management System (RWQMS);
- All outstanding recommendations from IPART's 2017-18 operational audit for DWQMS and RWQMS have been addressed;
- Full compliance with regulatory requirements as specified in the Australian Drinking Water Guidelines (ADWG);
- All actions prioritised in the Drinking Water Quality Improvement Plan (DWQIP) completed;
- Water quality parameters at Critical Control Points (CCPs) reviewed and revised in consultation with NSW Health;
- Proposed changes to current CCPs and site specific recycled water quality management plans (RWQMPs) notified to key stakeholders and in-train for finalisation with NSW Health;
- System performance standards for water pressure, water continuity and wastewater overflows met.

Water conservation

- Average household water consumption of 172 kilolitres per annum within target levels equal to or less than the five-year rolling of 215 kilolitres per annum;
- Leak detection undertaken on over 5,000 kilometres of mains (more than 100%) across the water network;
- Reduction in real losses from 3.9 to 3.6 kilolitres per day per kilometre of water main;
- Average annual yield estimate of 76 billion litres of water from Hunter Water's existing storages, which is within the 2014 Lower Hunter Water Plan (LHWP) level of service standards;
- Development of an updated water conservation program, informed by our recently approved economic level of water conservation (ELWC) methodology;
- Continued community engagement to increase awareness and promote water conservation behaviour, including school visits and our Love Water campaign; and
- Active input to the major update of the Lower Hunter Water Plan (LHWP), including the engagement of community through deliberative forums in Newcastle and Maitland.

Organisational systems management

- Hunter Water became the first urban Australia water utility to be certified to the new ISO 55001:2014 asset management standard;
- No major non-conformances with the Asset Management System (AMS) were identified during third party audits or internal audits and certification maintained to ISO 55001:2014;



- No major non-conformances with the Environmental Management System (EMS) were identified during third party audits or internal audits and certification maintained to ISO 14001:2016;
- No major non-conformances with the Quality Management System (QMS) were identified during third party audits or internal audits and certification maintained to ISO 9001:2015;
- Adoption of an integrated approach to managing the management systems in the form of an Integrated Management System (IMS). The IMS provides processes principles and guidelines across the common functions of the AMS, EMS, QMS, Health and Safety Management System (HSMS) and Information Security Management System (ISMS). No major non-conformances with the IMS were identified during third party audit/s;
- Improved Enterprise Risk Management (ERM) framework, updated to include risk appetite statements;
- Advanced planning and design for an integrated civil maintenance and field services management tool;
- Expanded catchment improvement and environmental monitoring activities;
- Continued works on the Lake Macquarie effects based assessment of wastewater discharges; and
- Completion of a best practice review of renewable energy from biosolids and identification of in-house efficiency and emission reduction opportunities.

Customer and stakeholder relations

- Regular consultation with our customers through the Customer and Community Advisory Group (CCAG). Revision of the CCAG Charter, with the assistance of the University of Technology Sydney's Institute for Sustainable Futures, to improve the operations of the CCAG and to strengthen the advisory role;
- Actions implemented to improve the effectiveness and timeliness of customer complaint responses;
- Expanded presence at community events to increase awareness and support for vulnerable customers, including refugees and people with a disability;
- Ongoing membership of the External Dispute Resolution Scheme, through the Energy and Water Ombudsman of NSW (EWON);
- Compliance with the Customer Complaint Management Standard and Guideline, AS/NZS 10002:2014.



1 INTRODUCTION

Hunter Water is a state-owned corporation that provides safe, reliable and efficient water and wastewater services to over half a million people in the Lower Hunter region. We also manage trunk stormwater channels in the Newcastle, Lake Macquarie and Cessnock local government areas. We are governed by the State Owned Corporations Act 1989 and Hunter Water Act 1991. The NSW government regulates Hunter Water's operations through a number of regulatory bodies and instruments.

Our Operating Licence is the key regulatory instrument that enables and requires us to provide services. The Operating Licence sets out the terms and conditions that specify how services are provided. It contains quality and performance standards that must be achieved. Through it, we are accountable to the NSW government for our performance. Our Licence adherence and performance is monitored and reviewed by the Independent Pricing and Regulatory Tribunal (IPART).

This Compliance and Performance Report provides detailed information on our performance during 2018-19 with respect to prescribed clauses of the Operating Licence¹ and in accordance with the associated Reporting Manual².

The contents of this report are as follows:

- Chapter 2 - the water quality performance of our drinking water and recycled water systems. We also report our performance against the minimum standards in our Operating Licence for water pressure, water continuity and wastewater overflows system performance.
- Chapter 3 - our water conservation performance.
- Chapter 4 - performance of our asset, environmental and quality management systems.
- Chapter 5 - Our customer and stakeholder performance.
- Chapter 6 – a glossary of technical terms.

¹ NSW Government 2017, Hunter Water Operating Licence 2017-2022

² NSW Government 2017, Hunter Water Operating Licence Reporting Manual 2017-2022



2 SUPPLY SERVICES AND PERFORMANCE STANDARDS

2.1 Drinking water

2.1.1 Overview of drinking water supply systems

Hunter Water supplies high quality drinking water to more than half a million people in the Lower Hunter region of New South Wales: in the local government areas of Newcastle, Lake Macquarie, Maitland, Cessnock, Port Stephens, Dungog and small parts of Singleton. Our drinking water systems are managed in accordance with the Australian Drinking Water Guidelines 2011 (ADWG) framework for management of drinking water quality (referred to as 'the framework').³ The framework is based on the application of multiple barriers (preventive measures at all steps in the drinking water system) to ensure that consistently safe drinking water is supplied.

Drinking water systems consist of:

- **Catchments**

Water is collected in the natural landscape by creeks, rivers and groundwater systems. Water quality in our catchments is protected by regulation that controls activities that are allowed within them.⁴ We also work closely with the community and stakeholders on land management and development to ensure that it is undertaken in a manner appropriate for a drinking water catchment. The locations of our drinking water catchments are shown in Figure 2-1.

- **Storages**

Water is stored in dams and groundwater sandbeds (aquifers) before it is treated to drinking standards. Drinking water storages that we own are: Chichester Dam, Grahamstown Dam, Tomago Sandbeds and Anna Bay Sandbeds. Some water is also sourced from the Paterson River (via Lostock Dam, which is owned by WaterNSW) and the Allyn River. The locations of our storages are shown in Figure 2-1 and capacities are provided in Table 2-1.

- **Water treatment plants**

We operate six water treatment plants (WTPs) that treat water to a quality suitable to safely drink. These water treatment plants are Dungog WTP, Grahamstown WTP, Lemon Tree Passage WTP, Anna Bay WTP, Nelson Bay WTP and Gresford WTP. The locations of our WTPs are shown in Figure 2-1.

- **Water supply systems**

The water that we supply is transported and stored within a closed distribution network. All clear water tanks and storage reservoirs within the distribution system are fully covered and regular inspections are undertaken to ensure that the integrity of the system is maintained. Security measures are in place to prevent unauthorised access to water storages. Maintenance and construction activities are undertaken in accordance with procedures that are designed to ensure that drinking water quality is protected. We have backflow prevention measures in place to minimise the likelihood of backflow of potentially contaminated water from customers' properties into the water supply system. Water supply systems are shown in Figure 2-2 and further described in Section 2.1.2.

We also supply and receive some drinking water from outside of our area of operations. We supply a small volume of treated water to MidCoast Council in Karuah (4.6 ML in 2018-19) and can also supply and receive bulk treated water from the Central Coast.

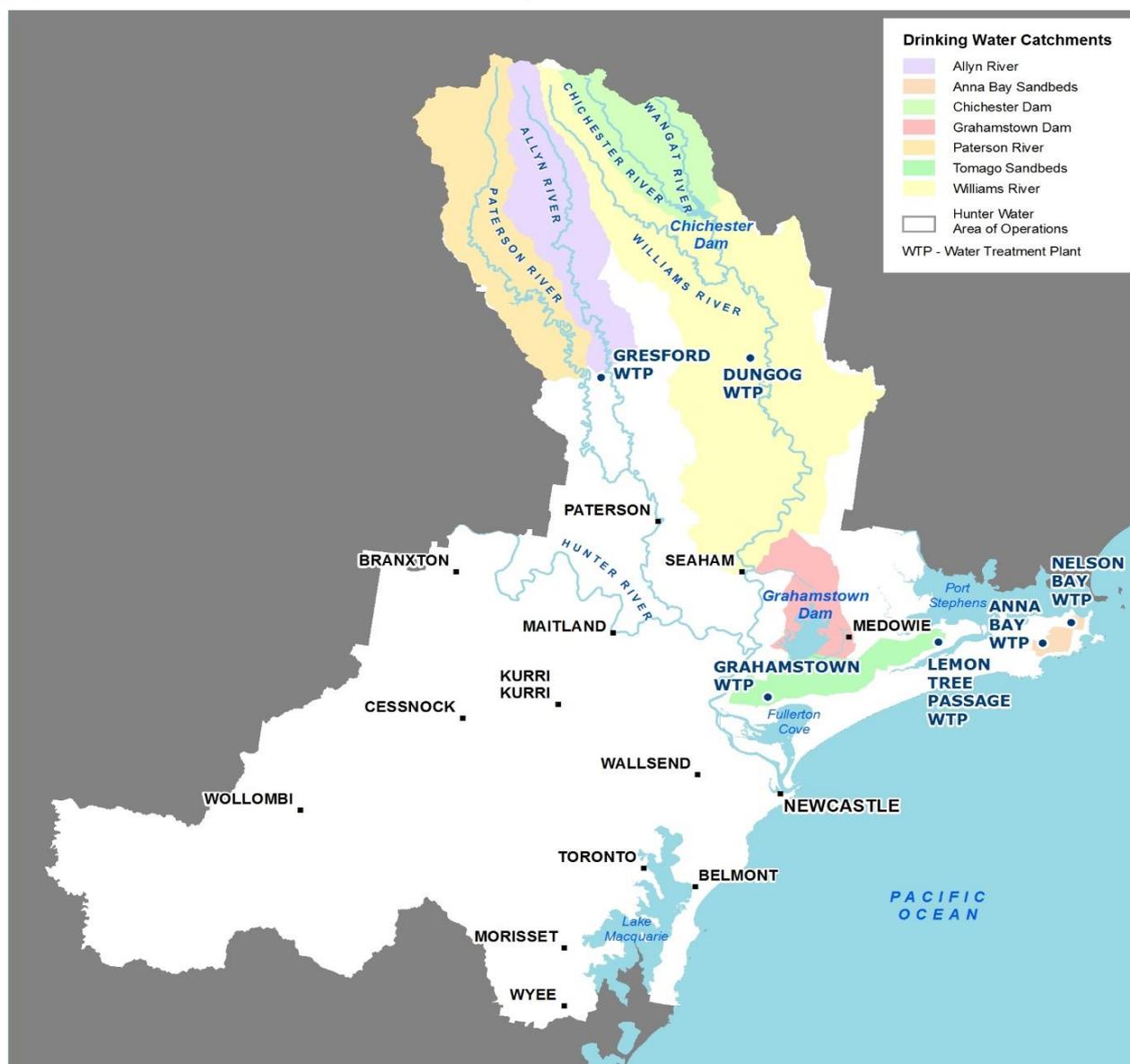
³ National Health and Medical Research Council, 2016, Australian Drinking Water Guidelines 2011, – updated Aug 2018

⁴ *Hunter Water Regulation 2015, Part 2 – Special Areas.*



During 2018-19, we supplied 2,161 ML of water to the Central Coast and received 198.5 ML from Central Coast Council's water supply system. Central Coast Council maintain a quality assurance program for their water supply systems under the *NSW Public Health Regulation 2012*. We also provided small volumes of water to private network operators within the Hunter Water area of operations, including 2.5 ML to Cooranbong Water, 85.2 ML to Huntlee Water, and 1,180.6 ML to Kooragang Island Water.

Figure 2-1 Hunter Water's catchments, storages and water treatment plants



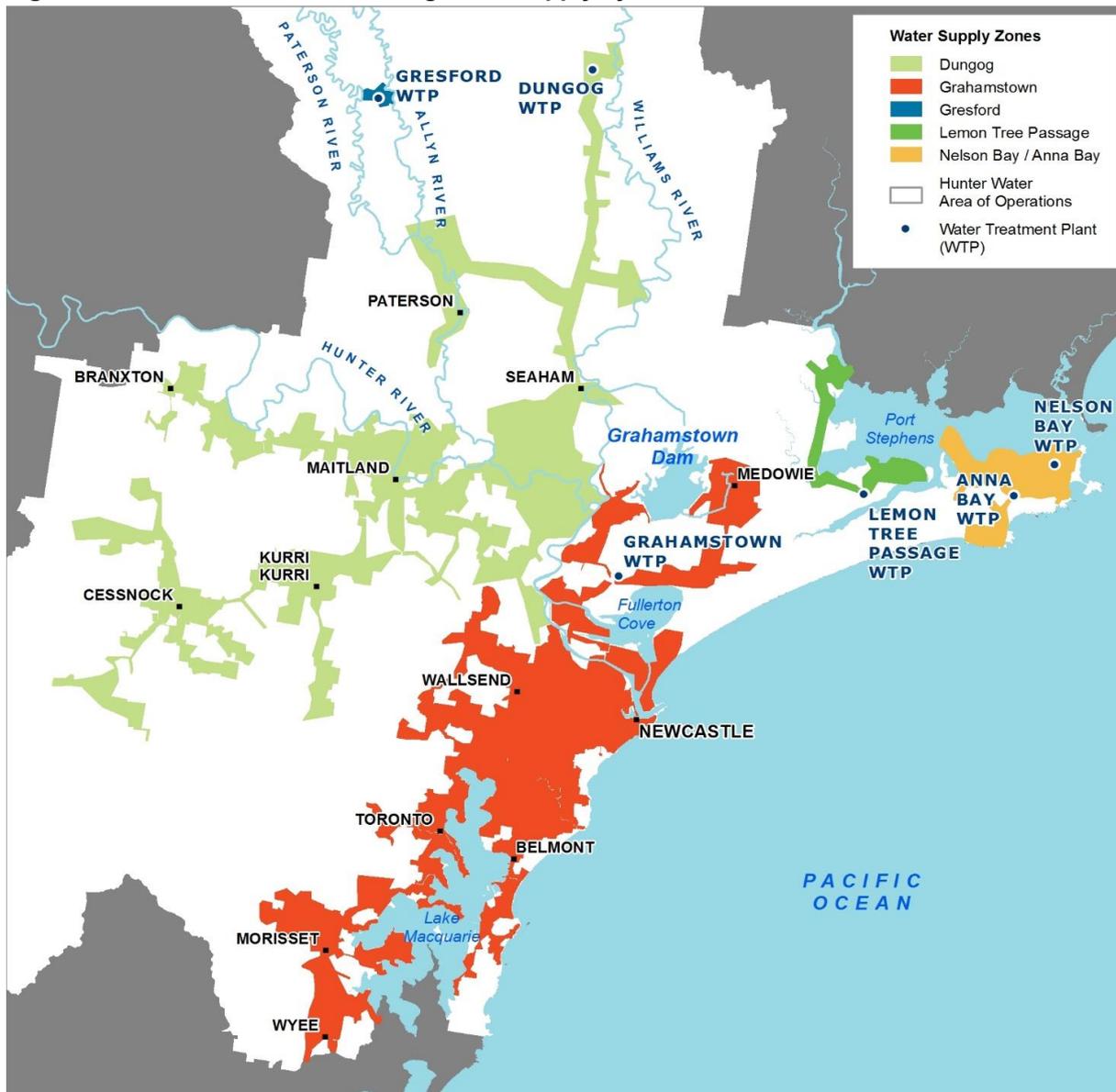
Source: Hunter Water

Table 2-1 Capacity of Hunter Water's water storages

Water Source	Maximum Capacity (ML)
Chichester Dam	18,356
Grahamstown Dam	182,305
Tomago Sandbeds	60,000
Anna Bay Sandbeds	16,024
Total storage	276,685



Figure 2-2 Hunter Water's drinking water supply systems



Source: Hunter Water

2.1.2 Performance at critical control points

Where practical, water quality parameters at Critical Control Points (CCPs) are continuously monitored using a supervisory control and data acquisition (SCADA) system. Operational limits for CCPs are set at levels that are more stringent than the critical limit. Using SCADA, alarm limits are set so that corrective action can be taken before the critical limit is reached.

Exceedance of the critical limit indicates a risk of unacceptable water quality being supplied to customers. If a critical limit is exceeded a corrective action and investigation occurs. To minimise the likelihood of exceeding critical limits Hunter Water has implemented automatic shutdowns for key water quality parameters at all WTPs.

We reviewed and revised our CCPs in 2018-19 in consultation with NSW Health.

An outline of each of our water supply zones and performance at CCPs during 2018-19 is set out below. An exceedance of a CCP does not necessarily indicate that unsafe water quality was supplied to customers, rather



it means that the risk threshold was exceeded and a corrective response was required. A brief explanation of each of the water treatment processes referenced in this section is included in the Glossary (see Section 6.2).

Dungog water supply system

Water from Chichester Dam is treated at Dungog WTP. Dungog WTP is a direct filtration plant with a maximum capacity of 90 ML/day. Treatment processes at the plant are:

- raw water chlorination
- powdered activated carbon (PAC) dosing (event-based)
- coagulation / flocculation
- filtration
- pH correction
- disinfection
- fluoridation

The majority of water from the Dungog WTP is fed by gravity trunk main to the Cessnock, Maitland and Newcastle areas. Water supplied to Maitland and Cessnock is re-chlorinated at the outlet of Four Mile Creek Reservoir. Water from the Chichester Trunk Gravity Main (CTGM) also gravitates to the Newcastle and Lake Macquarie areas (Grahamstown water supply zone), where it blends with water supplied from Grahamstown WTP. The estimated permanent population within the Dungog water supply system is 149,000 people. Performance at CCPs within the system is provided in Table 2-2.

Table 2-2 Dungog water supply system: CCPs performance 2018-19

Critical control point	Critical limit	Compliant
Dungog WTP coagulation and filtration	Individual filters. Filtered water turbidity must not exceed 0.5 NTU for > 15 consecutive minutes at individual filter outlets.	✓
Dungog WTP post-filtration disinfection	Disinfection prior to first customer. (Chlorine Contact Time (CT) must not be less than 4 min.mg/L) ^a	✓
	pH at clear water tank outlet must not be less than 6 or greater than 9 for > 15 consecutive minutes	✓
	Free chlorine residual at clear water tank outlet must not exceed 4.5 mg/L for > 15 minutes	✓
Dungog WTP fluoridation	Fluoride concentration at clear water tank outlet must not exceed 1.5 mg/L	✓
Four Mile Creek reservoir chlorinator	Free chlorine residual at water main re-chlorination facilities must not exceed 4.5 mg/L for > 15 consecutive minutes	✗ ^b

- a) Chlorine Contact time (CT) is calculated using chlorine, flow and Clear Water Tank level data. A surrogate limit of 0.2mg/L free chlorine at the Clear Water Tank outlet applies.
- b) Free chlorine residual recorded at Four Mile Creek Chlorinator exceeded 4.5 mg/L between 1:41 pm and 1:58 pm (17 minutes) on the 3rd of April 2019. The exceedance occurred during planned valving works. Sampling and analysis was arranged to determine the chlorine residual at first customers off the downstream Maitland and Cessnock trunk mains. The chlorine results were within the ADWG guideline. There were no customer complaints received in relation to this brief exceedance. An independently facilitated root-cause analysis was undertaken, with recommended preventive actions either implemented or underway.



Grahamstown water supply system

Water from Grahamstown Dam and the Tomago Sandbeds is treated at Grahamstown WTP. The plant has a maximum capacity of 266 ML/day and includes the following treatment processes:

- PAC dosing (event-based)
- aeration (Tomago Sandbeds water only, see below)
- coagulation / flocculation
- sedimentation
- filtration
- pH correction
- disinfection
- fluoridation

Treated water from Grahamstown WTP is pumped to Newcastle and Lake Macquarie, as well as Medowie, Stockton and Kooragang Island. The water is re-chlorinated at four locations within the Newcastle and Lake Macquarie distribution system to improve the chlorine residual in order to minimise water quality risk within the distribution system. Water from this supply zone is also pumped to the Tomaree Peninsula to form part of the supply to Port Stephens. The estimated permanent population within the Grahamstown water supply system is 393,000 people. Performance at CCPs within the water supply system is summarised in Table 2-3.

Table 2-3 Grahamstown water supply system: CCPs performance 2018-19

Critical Control Point	Critical Limit	Compliant
Grahamstown WTP coagulation and filtration	Filtered water turbidity must not exceed 0.5 NTU for > 15 consecutive minutes at individual filter outlets.	✓
Grahamstown WTP and mains disinfection	Disinfection prior to first customer (Chlorine Contact Time (CT) must not be less than 4 min.mg/L) ^a	✓
	pH at clear water tank outlet must not be less than 6 or greater than 9 for > 15 consecutive minutes	✓
	Free chlorine residual post rechlorination must not exceed 4.5 mg/L for > 15 consecutive minutes	✓
Grahamstown WTP fluoridation	Fluoride concentration at clear water tank outlet must not exceed 1.5 mg/L	✓
Cardiff South Chlorinator	Free chlorine residual at water mains rechlorination facilities must not exceed 4.5 mg/L for > 15 consecutive minutes	✓
Elmore Vale Chlorinator	Free chlorine residual at water mains rechlorination facilities must not exceed 4.5 mg/L for > 15 consecutive minutes	✓
North Lambton Chlorinator	Free chlorine residual at water mains rechlorination facilities must not exceed 4.5 mg/L for > 15 consecutive minutes	✓
Toronto Chlorinator	Free chlorine residual at water mains rechlorination facilities must not exceed 4.5 mg/L for > 15 consecutive minutes	✓

a) Chlorine Contact Time (CT) is calculated using chlorine, flow and Clear Water Tank level data. A surrogate limit of 0.25mg/L free chlorine at the Clear Water Tank inlet and mains chlorination applies.



Lemon Tree Passage water supply system

Water from the Tomago Sandbeds is treated at Lemon Tree Passage WTP. The plant has a maximum capacity of 5 ML/day and includes the following processes:

- aeration
- coagulation / flocculation
- two stage filtration
- pH correction
- disinfection
- fluoridation

Treated water is pumped from Lemon Tree Passage WTP to Tanilba Bay, Mallabula, Lemon Tree Passage, Swan Bay and Karuah. The estimated permanent population supplied by this system is 8,600 people.

Performance at CCPs within the water supply system is summarised in Table 2-4.

Table 2-4 Lemon Tree Passage water supply system: CCPs performance 2018-19

Critical Control Point	Critical Limit	Compliant
Lemon Tree Passage WTP coagulation and filtration	Filtered water turbidity must not exceed 1 NTU for > 15 consecutive minutes at secondary filter outlets	✓
Lemon Tree Passage WTP disinfection	Disinfection prior to first customer (Chlorine Contact Time (CT) must not be less than 4 min.mg/L) ^a	✓
	pH at clear water tank outlet must not be less than 6 or greater than 9 for > 15 consecutive minutes	✓
	Free chlorine residual at the clear water tank outlet must not exceed 4.5 mg/L for > 15 consecutive minutes. If this limit is breached, free chlorine residual is calculated at the clear water tank outlet to determine the quality of water supplied to customers.	✓
Lemon Tree Passage WTP fluoridation	Fluoride concentration at clear water tank inlet must not exceed 1.5 mg/L for > 5 consecutive minutes	✓ ^b

- a) Chlorine Contact Time (CT) is calculated using chlorine, flow and Clear Water Tank level data. A surrogate limit of 0.2mg/L free chlorine at the Clear Water Tank inlet applies.
- b) If this limit is exceeded, fluoride concentration is derived at the outlet to determine the quality of water supplied to customers, i.e. to ensure that water quality supplied to customers does not exceed the ADWG guideline of 1.5 mg/L.



Anna Bay and Nelson Bay water supply system

The Anna Bay Sandbeds are located within the protected catchment of the Tomaree National Park and groundwater is naturally filtered within the sandbeds. Water is extracted using a network of production bores and treated at Anna Bay and Nelson Bay WTPs.

Each WTP can supply a maximum flow of about 12 ML/day using the following processes:

- aeration
- pH correction
- disinfection
- fluoridation

Water from the WTPs supplies the Tomaree Peninsula including Anna Bay, Boat Harbour, Salamander Bay, Nelson Bay, Fingal Bay, Shoal Bay, Corlette and Soldiers Point. The estimated permanent population within the water supply system is 37,900 people. Water from Grahamstown WTP can also supplement this water supply system. Performance at CCPs within the water supply system is summarised in Table 2-5.

Table 2-5 Anna Bay/ Nelson Bay water supply system: CCPs performance 2018-19

Critical Control Point	Critical limits	Compliant
Anna Bay WTP disinfection	Disinfection prior to first customer (Chlorine Contact Time (CT) must not be less than 4 min.mg/L) ^a	✓
	Free chlorine concentration at clear water tank inlet must not exceed 4.5 mg/L for > 15 minutes. If this limit is breached, free chlorine residual is calculated at the clear water tank outlet to determine the quality of water supplied to customers.	✓
	pH at clear water tank outlet must not be less than 6 or greater than 9 for > 15 consecutive minutes	✓
	Turbidity at clear water tank outlet must not exceed 5 NTU for > 5 consecutive minutes	✓
Nelson Bay WTP disinfection	Disinfection prior to first customer (Chlorine Contact Time must be less than 4 min.mg/L) ^a	✓
	pH at the clear water tank inlet must not be less than 6 or greater than 9 for > 15 consecutive minutes	✓
	Free chlorine residual at clear water tank outlet must not exceed 4.5 mg/L for > 15 consecutive minutes.	✓
	Turbidity at clear water tank outlet must not exceed 5 NTU for > 5 consecutive minutes	✓
Anna Bay/Nelson Bay WTP fluoridation	Fluoride concentration at clear water tank inlet must not exceed 1.5 mg/L for > 5 consecutive minutes. If this limit is exceeded, fluoride concentration is derived at the outlet to determine the quality of water supplied to customers.	✓

a) Chlorine Contact Time (CT) is calculated using chlorine, flow and Clear Water Tank level data. A surrogate limit of 0.3 mg/L and 0.2 mg/L free chlorine applies at the Clear Water Tank inlets, at Anna Bay WTP and Nelson Bay WTP, respectively.



Gresford water supply system

Water is extracted from the Allyn and Paterson Rivers at Gresford, and is treated at the Gresford WTP. The plant has a maximum capacity of 0.5 ML/day and includes the following processes:

- membrane microfiltration
- disinfection

Performance at CCPs within the water supply system is summarised in Table 2-6.

Table 2-6 Gresford water supply system: CCPs performance 2018-19

Critical Control Point	Critical Limit	Compliant
Gresford WTP microfiltration	Filtered water turbidity must not exceed 0.5 NTU for > 15 consecutive minutes at clear water tank inlet	✓
	Calculated pressure decay rate across membranes must not exceed 10 kPA/min	✓
Gresford WTP disinfection	Disinfection prior to first customer (Chlorine Contact Time (CT) must not be less than 4 min.mg/L) ^a	✓
	pH at the clear water tank inlet must not be less than 6 or greater than 9 for > 15 consecutive minutes	✓
	Free chlorine concentration at the clear water tank outlet must not exceed 4.5 mg/L for > 15 minutes.	✓

a) Chlorine Contact Time (CT) is calculated using chlorine, flow and Clear Water Tank level data. A surrogate limit of 0.2 mg/L free chlorine at the Clear Water Tank inlet applies.

2.1.3 Verification monitoring

The ADWG Drinking Water Quality Framework emphasises a preventive approach, including operational monitoring and process control, combined with verification monitoring to confirm that preventive measures have been effective: ⁵

Verification of drinking water quality provides an important link back to the operation of the water supply system and additional assurance that the preventive measures and treatment barriers in the water supply system have worked, and are working, to supply safe drinking water.

Verification monitoring is based on results of water quality samples that are representative of water supplied to customers' taps. Water quality standards specified in the ADWG are considered safe for people to drink over an entire lifetime. Therefore, licence performance is a statistical analysis of results, based on percentage compliance rather than absolute figures. In 2018-19, full compliance with regulatory requirements was achieved for verification monitoring. The performance and mean results of analysis for key microbiological and physical / chemical parameters are shown in Table 2-7, Table 2-8 and Table 2-9. Descriptions of the parameters are provided in glossary to this report.

⁵ National Health and Medical Research Council, 2016, Australian Drinking Water Guidelines 2011– updated Aug 2018, Element five, Section 9.5, p. 140.



Table 2-7 Microbiological water quality 2018-19

Parameter	Health / Aesthetic	Measure of Compliance	Performance Standard	Whole of Hunter Water 12 Months Samples	Compliant
E.coli	Health	% of samples containing < 1 Most Probable Number (MPN) per 100 mL	>98% of samples shall contain <1 MPN per 100 mL	99.94% of samples contained < 1 MPN per 100 mL	✓

Table 2-8 Key health physical / chemical analytes 2018-19

Analyte	Units of Measure	ADWG health guideline value	Performance standard (assessment over 12 months)	95th Percentile over the last 12 months	Compliant
Fluoride	mg/L	1.5	95th percentile of test results less than respective ADWG health guideline value	1.03	✓
Chlorine	mg/L	5		1.22	✓
Copper	mg/L	2		0.022	✓
Lead	mg/L	0.01		0.001	✓
Manganese	mg/L	0.5		0.009	✓
Trihalomethanes	mg/L	0.25		0.139	✓

Table 2-9 Key aesthetic physical / chemical analytes 2018-19

Analyte	Units of Measure	ADWG aesthetic guideline value	Performance standard (assessment over 12 months)	12 month average result	Compliant
Iron	mg/L	0.3	Average of test results less than respective ADWG aesthetic guideline value	0.026	✓
Aluminium	mg/L	0.2		0.051	✓
Copper	mg/L	1		0.008	✓
Zinc	mg/L	3		0.005	✓
Turbidity	NTU	5		0.2	✓
True colour	HU	15		5	✓
pH	pH units	6.5-9.2	Average of results between 6.5 and 9.2	7.60	✓



2.1.4 Drinking water quality management activities and programs in 2018-19

Improvements to drinking water quality management undertaken or underway during 2018-19 are shown in Table 2-10.

Table 2-10 Drinking water quality management activities and programs 2018-19

ADWG Framework sub-element	Water quality objective	Activity / Program	Results / Outcomes
3.1 Preventive Measures and Multiple Barriers	Minimise impact of dairy industry on drinking water catchments.	Sustainable Agriculture Project.	Sustainable Agricultural Project implementation commenced for the Paterson and Allyn River valleys and the Upper Chichester River.
3.1 Preventive Measures and Multiple Barriers	Mitigate pathogen risks for Gresford WTP.	Prepare Business Case for additional treatment barrier to Gresford WTP.	Business case completed for a UV treatment barrier, with approval of design development funding.
10.1 Documents and Records	Document information pertinent to all aspects of drinking water quality management.	DWQMS manual peer review and update.	The DWQMS manual was reviewed and updated with assistance from an independent water quality specialist to ensure it reflects current practice.
3.2 Critical Control Points	Improved monitoring of fluoride critical control points.	Install fluoride analysers at clear water tank outlets.	Installation complete. Full operation to commence in 2019-2020.
3.2 Critical Control Points	Improved monitoring of disinfection critical control points.	Review / development of disinfection critical control points.	Revised disinfection critical control point concept for each WTP submitted to NSW Health.
3.1 Preventive Measures and Multiple Barriers	Improved chlorine residuals across the network.	Distribution system Disinfection Optimisation Strategy (DOS) Stage 1B program of chlorinator upgrades.	Design development progressed. Upgrades currently expected to be completed in 2020.
3.1 Preventive Measures and Multiple Barriers	Improved barriers to pathogen contamination in the distribution network.	Review and improve distribution network reservoir inspection process.	The reservoir inspection process was reviewed and improved including refinements to the inspection form.
2.3 Hazard Identification and Risk Assessment	Improved risk management processes.	Improve document regarding the process for undertaking the catchment to tap risk assessments	A catchment to tap risk assessment guideline was completed.
4.2 Operational Monitoring	Operational monitoring of potential PFAS risks to drinking water quality.	Implement PFAS Operating Strategy for the Tomago Borefield.	PFAS Operating Strategy for the Tomago Borefield has been implemented and adhered to by Hunter Water.
2.3 Hazard Identification and Risk Assessment	Identify hazards to drinking water quality.	Review hazards associated with the drinking water supply scheme between Hunter Water and Central Coast Council.	A drinking water quality risk assessment was conducted in consultation with Central Coast Council and NSW Health.



2.1.5 Proposed drinking water quality management activities and programs

Proposed measures to improve drinking water quality management in the future are outlined in Table 2-11.

Table 2-11 Proposed drinking water quality management activities and programs

ADWG Framework sub-element	Water quality objective	Activity / Program	Scope / Expected Outcomes / Timeframe
3.1 Preventive Measures and Multiple Barriers	Hygienic water main repair and construction.	Implement improved hygienic water main repair and construction standards.	New improved hygiene standards implemented including water quality acceptance testing, updated procedures and staff training.
9.1 Investigative Studies and Research Monitoring	Increase understanding of emerging risks to the water supply system.	Thermophilic amoeba review and management strategy.	Develop a strategy for the management of thermophilic amoeba risk, to be presented to NSW Health.
9.1 Investigative Studies and Research Monitoring	Increase understanding of emerging risks to the water supply system.	Investigations to characterise risk of emerging contaminants.	Increased understanding of the risk of emerging contaminants in our systems.
4.1 Operating Procedures	Mitigate potential drinking water quality risks associated with the drinking water distribution network.	Mitigate potential drinking water quality risks associated with water carter operations.	Review and improve as required the process for ensuring compliance with water carter Quality Assurance Programs for all water carters used by Hunter Water.
3.1 Preventive Measures and Multiple Barriers	Improved barriers to pathogen contamination.	Dungog WTP upgrades / modifications.	Completion of an upgrade to the filtration system (filter to waste capability), chemical dosing systems and backwash tank enclosure.
3.1 Operating procedures	Evaluate alternative or additional preventive measures where improvement is required.	Water Treatment Plant master planning.	Developed master plans to cater for future demand and water quality requirements for all Water Treatment Plants.
1.2 Regulatory and Formal Requirements	Ensure responsibilities are understood and communicated to employees.	DWQMS awareness sessions and targeted training.	Training and awareness activities added to training needs matrix.
10.1 Management of Documentation and Records	Document information pertinent to all aspects of drinking water quality management.	DWQMS manual update.	The DWQMS manual will be reviewed and updated.
3.1 Preventive Measures and Multiple Barriers	Improved chlorine residuals across the network.	Disinfection Optimisation Strategy (DOS) Stage 1B.	Delivery of project by 2021 to improve dosing/mixing at priority reservoirs, and network chlorinator upgrades.
3.2 Critical Control Points	Improved monitoring of disinfection critical control points.	Implement revised disinfection CCP at all WTPs.	Implemented at all WTPs by 2020.
2.3 Hazard Identification and Risk Assessment	Identify and document hazards, sources and hazardous events	Update of the Grahamstown WTP risk assessment.	Risk workshop to be undertaken in 2019 followed by prioritisation of recommendations on the drinking water quality improvement plan.



2.1.6 Continual improvement of the DWQMS in 2018-19

Senior executives at Hunter Water provide support and oversight focused on managing and continuous improvement of our drinking water systems. Drinking water quality improvement initiatives are documented, prioritised and tracked in the drinking water quality improvement plan (DWQIP). Improvements that were undertaken in 2018/19 included the following:

- Assessment of water quality risks associated Hunter Water and Central Coast Drinking Water Transfer scheme.
- Prioritisation of improvement actions related to maintenance hygiene procedures.
- Review and improvement of the risk assessment process to ensure it is clear and transparent.
- A revised concept for Disinfection Critical Control Points was developed in consultation with NSW Health.

During 2018/19, Hunter Water completed 100% of actions prioritised in the DWQIP.

2.1.7 Significant changes to the drinking water quality management system

We proposed to make two significant changes to the Drinking Water Quality Management System during 2018-19. We notified NSW Health of the proposed change on 5 March 2019. The proposed changes included:

- Changing the disinfection CCP at all WTPs as agreed with NSW Health. The proposed disinfection CCP includes a revised concept for monitoring and calculation of the product of free chlorine residual and contact time (Ct in mg-mins/Litre) as well as a new critical limit based on a Ct of 15 mg-mins/Litre.
- Changing the pH CCP critical limit at all WTPs as agreed with NSW Health. The revised pH CCP critical limit is proposed to be pH greater than 9 for 15 minutes.

We are continuing to consult with NSW Health on the proposed changes.

2.1.8 Non-conformances with the Drinking Water Quality Management System

There were no non-conformances with the Drinking Water Quality Management System during 2018-19.



2.2 Recycled water

Hunter Water manages its recycled water schemes in a way that protects human health and the environment and complies with customer agreements and other relevant regulatory requirements. Our 2017-2022 Operating Licence requires us to maintain and implement a system for managing recycled water quality that is consistent with the Australian Guidelines for Water Recycling 2006 (AGWR). A key component of complying with the AGWR is the implementation of a risk-based management framework, including critical control points (CCPs).

The AGWR requires Recycled Water Quality Management Plans (RWQMPs) to be developed for all recycled water schemes. A RWQMP is a documented system for managing the production and supply of recycled water and consolidates all essential information surrounding the operation and management of the recycled water system.

We have developed RWQMPs for all our recycled water schemes, addressing the 12 elements as described in the AGWR. We undertake a rolling review process for our RWQMPs.

This section of the report describes:

- Hunter Water's recycled water schemes
- Performance at CCPs during 2018-19
- Recycled water quality management activities completed during 2018-19
- Proposed future activities
- Continual improvement activities undertaken during 2018-19
- Significant changes made to the Recycled Water Quality Management System (RWQMS) in 2018-19
- Any non-conformances with the RWQMS.

2.2.1 Overview of recycled water schemes

During 2018-19 Hunter Water's recycled water schemes provided recycled water from the Branxton, Cessnock, Clarence Town, Dora Creek, Dungog, Edgeworth, Karuah, Kurri Kurri and Morpeth Wastewater Treatment Works (WWTW) and the Shortland WWTW (part of the Kooragang Industrial Water Scheme) – see Table 2-12. The location of our recycled water schemes are shown in Figure 2-3.

Table 2-12 Hunter Water's recycled water schemes

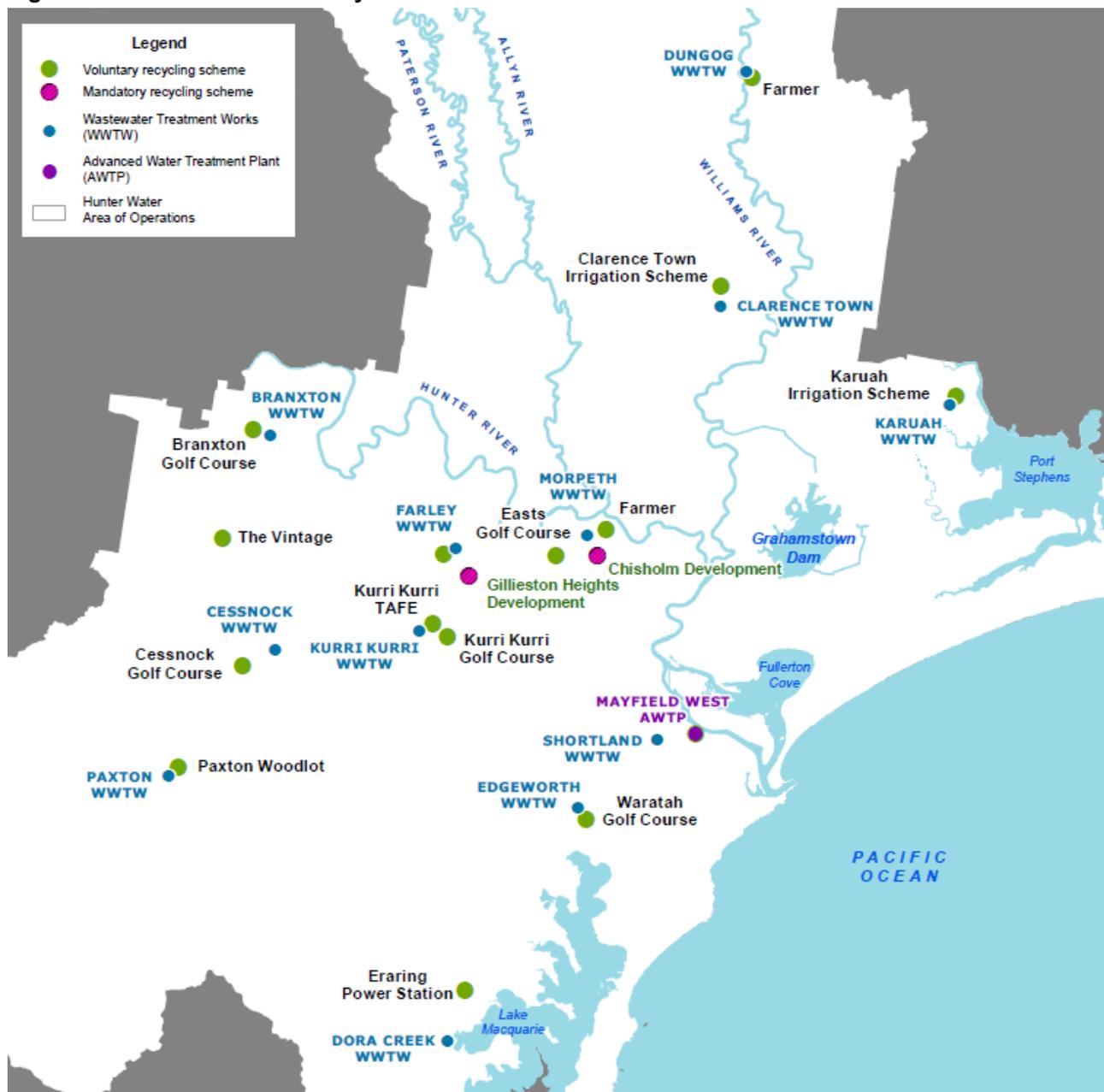
Recycled water source	Recycled water use	2018-19 reuse volumes (ML)
Branxton WWTW	Branxton Golf Course and The Vintage Golf Course	248
Cessnock WWTW	Cessnock Golf Course ^b	124
Clarence Town WWTW	Clarence Town Irrigation Scheme	53
Dora Creek WWTW	Eraring Power Station	1153
Dungog WWTW	Local farmer	262
Edgeworth WWTW	Waratah Golf Course	82
Karuah WWTW	Karuah Irrigation Scheme	119
Kurri Kurri WWTW	Kurri Kurri Golf Course and Kurri Kurri TAFE	74
Shortland WWTW	Water Utilities Australia	2157
Morpeth WWTW	East's Golf Course and local farmer	145
Paxton WWTW	Paxton woodlot	22
Total		4,439 ^a

a) Total excludes use by Hunter Water onsite at WWTW and indirect agricultural reuse.

b) During 2018-19, Cessnock Golf Course ceased trading and is no longer receiving recycled water.



Figure 2-3 Hunter Water's recycled water schemes





2.2.2 Performance of critical control points

The following sections describe performance at CCPs. A brief explanation of each of the wastewater treatment terms referenced is included in the glossary.

Branxton wastewater treatment works

Branxton WWTW receives wastewater from Branxton East, Branxton and Greta. Influent entering the system is primarily residential (domestic) with only a small volume of trade waste flows from retail outlets, hotels and small automotive repair garages.

Branxton WWTW includes the following processes:

- screening and grit removal
- bioreactor
- membrane filtration
- chlorination



Recycled water from Branxton WWTW is supplied to Branxton Golf Course and The Vintage Golf Course. Performance at CCPs within the Branxton WWTW during 2018-19 is shown in Table 2-13.

Table 2-13 Branxton WWTW: recycled water scheme CCPs performance 2018-19

Critical control point	Critical limit	Compliant
Membranes filtration	Turbidity of permeate at each individual membrane train must not exceed 0.5 NTU for > 120 seconds	✘ ^a
Chlorination system	Chlorine contact time must be at least 8.3 min.mg/L	✓
	pH upstream of chlorine contact tank must not exceed 9	✓

a) Recycled Water with turbidity levels that breached the Membrane Filtration CCP was supplied to the Branxton Golf Course on 6 September 2018. Elevated turbidity levels were recorded for the permeate flow for membrane 2 when the membrane was returned to service following the completion of a maintenance clean. The membrane was in permeate production for 18 minutes until the turbidity reading dropped below 0.5 NTU. The flow was treated by chlorination. Approximately 4.5 kL of recycled water was pumped from the Branxton WWTW reuse storage pond to the Branxton Golf Club onsite storage tanks. The golf club were filling their onsite tanks during this time, however were not irrigating the golf course. Recycled water quality samples were collected from the Branxton WWTW reuse storage pond and Branxton Golf Club onsite storage tanks, returning readings <1 CFU/100mL E. coli (within guideline limits).



Cessnock wastewater treatment works

Cessnock WWTW receives wastewater from the Cessnock local government area. Influent entering the system is primarily residential (domestic). There are also a number of commercial trade waste customers discharging to the system.

Cessnock WWTW includes the following processes:

- screening
- clarification
- trickling filters
- maturation ponds
- dissolved air floatation
- UV disinfection



Recycled water from the Cessnock WWTW is supplied to the Cessnock Golf Course. Cessnock Golf Course ceased trading in 2018-19 and is no longer receiving recycled water. Performance at CCPs within the Cessnock WWTW is shown in Table 2-14.

Table 2-14 Cessnock WWTW: recycled water scheme CCPs performance 2018-19

Critical control point		Critical limit	Compliant
Lagoon ponding	Flow rate	<280 L/s for more than 60minutes when supplying recycled water to the customer	✓
UV System	UV operation	UV unit must be on when supplying recycled water to the customer	✓
		Bypass valve must be closed when supplying recycled water to the customer	✓
	UV calculated dose	>32mJ/cm ² with UV transmissivity at >40% at ADWF of 12ML/d when supplying recycled water to the customer	✓
	UV lamps	Minimum of 30 lamps operating when supplying recycled water to the customer	✓
	UV flow rate	<140L/s when pumping recycled water to the customer	✓



Clarence Town wastewater treatment works

Clarence Town WWTW receives wastewater from the township. Influent entering the system is primarily residential (domestic).

Clarence Town WWTW includes the following processes:

- oxidation ponds
- maturation ponds
- effluent storage ponds



Recycled water from the Clarence Town WWTW is supplied to an irrigation scheme. Performance at CCPs within the Clarence Town WWTW is shown in Table 2-15.

Table 2-15 Clarence Town WWTW: recycled water scheme CCPs performance 2018-19

Critical control point	Critical limit	Compliant	
Lagoon ponding	Flow rate	<252 kL/d when irrigating at the reuse area	✓
	Valve position	V1102 must be closed	✓
		V1100 must be open when irrigating on the reuse area	✓

Dora Creek wastewater treatment works

Dora Creek WWTW receives wastewater from Bonnells Bay, Silverwater, Morisset Park, Yarrawonga Park and Sunshine Brightwaters. Influent entering the system is primarily residential (domestic) with a number of trade waste customers also discharging to the treatment plant.

Dora Creek WWTW includes the following processes:

- screening
- grit removal
- bioreactor
- clarification
- effluent storage dam



Recycled water from Dora Creek WWTW is supplied to the Eraring Power Station. Performance at CCPs within the Dora Creek WWTW is shown in Table 2-16.

Table 2-16 Dora Creek WWTW: recycled water scheme CCPs performance 2018-19

Critical control point	Critical limit	Compliant
Secondary treatment process	Flow rate < 367 L/s for more than 60 minutes	✓
Effluent balance dam ponding	Flow rate < 734 L/s for more than 60 minutes	✓



Dungog wastewater treatment works

Dungog WWTW receives influent into the system that is primarily residential (domestic).



The Dungog WWTW includes the following processes:

- screening
- sedimentation
- trickling filters
- sludge digesters
- maturation ponds

Recycled water from Dungog WWTW is supplied to a local farmer. Performance at the CCP within the Dungog WWTW is shown in Table 2-17.

Table 2-17 Dungog WWTW: recycled water scheme CCP performance 2018-19

Critical control point	Critical limit	Compliant
Effluent reuse pond	Flow rate < 520kL/d for more than 4 days and reuse customer irrigating	✓



Edgeworth wastewater treatment works

Edgeworth WWTW receives wastewater from the Charlestown, Cardiff and Speers Point sewer catchment area. Influent entering the system consists primarily of residential (domestic) wastewater. There are also a number of commercial and industrial trade waste customers discharging to the system.

Edgeworth WWTW includes the following processes:

- screening
- bioreactor
- clarification
- UV disinfection



Recycled water from the Edgeworth WWTW is supplied to the Waratah Golf Course. Performance at CCPs within the Edgeworth WWTW is shown in Table 2-18.

Table 2-18 Edgeworth WWTW: recycled water scheme CCPs performance 2018-19

Critical control point		Critical limit	Compliant
Secondary Treatment	Flow rate	<873L/s for more than 60 minutes when pumping to customer	✓
	Aeration monitoring	0 m ³ /h in either tank for more than 8 hours while customer is taking recycled water	✓
UV System	UV operation	Must be on when reuse customer is being supplied recycled water	✓
	UV lamps	Minimum of 18 lamps per bank operating when supplying recycled water to the customer	✓
	UV calculated dose	Minimum dose 40 mJ/cm ² with UV transmissivity of 40% when reuse customer is being supplied with recycled water	✓
	UV flow rate	<80L/s per unit for 60 minutes when pumping recycled water to the customer	✓
		<160L/s for both units for 60 minutes when pumping recycled water to the customer	✓



Karuah wastewater treatment works

Karuah WWTW receives wastewater from the Karuah township. Influent entering the system is primarily residential (domestic).

Karuah WWTW includes the following processes:

- screening
- bioreactor
- UV disinfection
- effluent storage dam



Recycled water from Karuah WWTW is supplied to an irrigation scheme. Performance at CCPs within the Karuah WWTW is shown in Table 2-19.

Table 2-19 Karuah WWTW: recycled water scheme CCPs performance 2018-19

Critical control point		Critical limit	Compliant
Biological treatment	Inlet flow meter	<48.3 L/s for more than 60 minutes when irrigation is occurring	✓
	Aeration control	No aerators available/running during six consecutive IDEA cycles	✓
UV System	UV operation	UV bank must be on when irrigation is occurring	✓
	UV calculated dose	>35mJ/cm ² with a transmissivity of greater than 55% at 44L/s when irrigation is occurring	✓
	UV flow rate	<44L/s when irrigation is occurring	✓



Kurri Kurri wastewater treatment works

Kurri Kurri WWTW receives wastewater from the Kurri Kurri catchment area. Influent entering the system is primarily residential (domestic).

Kurri Kurri WWTW includes the following processes:

- screening
- bioreactor
- clarification
- tertiary filtration (dual media)
- UV disinfection



Recycled water from the Kurri Kurri WWTW is supplied to the Kurri Kurri TAFE and Kurri Kurri golf course. Performance at CCPs within the Kurri Kurri WWTW is shown in Table 2-20.

Table 2-20 Kurri Kurri WWTW: recycled water scheme CCPs performance 2018-19

Critical control point	Critical limit	Compliant	
Biological treatment	Inlet flow meter	<172 L/s for more than 60 minutes when the golf course is pumping recycled water	✓
	Aeration process	Air flow rate 0 m ³ /h for no more than 8hrs when pumping to the Golf course or effluent storage ponds	✓
Media filtration	Filter lift flow	<172 L/s for more than 60 minutes when pumping to the golf course or effluent storage ponds	✓
UV System	UV operation	Must not be off for more than 60 minutes when pumping to the golf course or Kurri TAFE storage pond	✓
	UV lamps	At least 18 lamps per bank must be on when pumping to the Golf course or Kurri TAFE storage ponds	✓
	UV calculated dose	>35mJ/cm ² for 60 minutes when pumping to the golf course or Kurri TAFE storage ponds	✓
	UV flow rate	<400L/s when pumping to the golf course or Kurri TAFE storage ponds	✓



Morpeth wastewater treatment works

Morpeth WWTW receives wastewater from Morpeth, Metford, Thornton, Tenambit, Ashtonfield, Beresfield, East Maitland and parts of Maitland. Influent entering the system is primarily residential (domestic).

Morpeth WWTW includes the following processes:

- screening
- bioreactor
- clarification
- UV disinfection
- maturation ponds



Recycled water from Morpeth WWTW is supplied to a local farmer and golf course. Performance at CCPs within the Morpeth WWTW is shown in Table 2-21.

Table 2-21 Morpeth WWTW: recycled water scheme CCPs performance 2018-19

Critical control point		Critical limit	Compliant
Secondary treatment processes	Biological treatment flow rate	< 500L/s when valve to maturation pond is open	✓
UV System	UV operation	Must be on when valve to the maturation pond is open	✓
	Flow rate through UV	< 500L/s when valve to maturation pond is opened	✓
	UV calculated dose	>32 mJ/cm ² with UV transmissivity at 40%	✓
	UV operation	Must be at least 48 out of 60 lamps when maturation pond valve is open and reuse customer is pumping	✓
Lagoon ponding	Inlet flow rate	<500 L/s when maturation pond valve is opened	✓



Shortland wastewater treatment works

The Shortland WWTW serves the communities of Sandgate, Shortland, Birmingham Gardens and Maryland as well as drawing in effluent from the Burwood catchment via the Newcastle 10 wastewater pumping station (WWPS). Influent entering the system is partly residential (domestic).

Shortland WWTW includes the following processes:

- screening
- activated sludge secondary treatment via two intermittently decanted aerated lagoons (IDAL)
- chlorination
- dechlorination (prior to environmental discharge)

Effluent from Shortland WWTW is supplied to the Mayfield West Advanced Water Treatment Plant owned by Water Utilities Australia. No CCP's are monitored at Shortland WWTW. There are critical operating points monitoring quality at Shortland WWTW, however, the CCP's previously monitored when Hunter Water owned the Kooragang Industrial Water Scheme are located at Mayfield West Advanced Water Treatment Plant (no longer owned by Hunter Water).



2.2.3 Recycled water quality management activities and programs 2018-19

Improvements to recycled water quality management undertaken during 2018-19 are described in Table 2-22.

Table 2-22 Recycled water activities and programs 2018-19

AGWR Framework sub-element	Recycled water objective	Activity / Program	Results / Outcomes
2.4 Hazard identification and risk assessment	Undertake a risk assessment.	Identify and document hazards and hazardous events, estimate the level of risk and determine preventive measures.	Cessnock WWTW and Cessnock Golf club were scheduled to be completed as part of our ongoing review process. However, Cessnock Golf Club ceased taking recycled water prior to the risk assessment being completed, therefore the review was not undertaken.
3.2 Critical control points	Document the critical control points (CCP), critical limits and target criteria.	Creation of a CCP response plan.	Veolia have documented CCP response requirements.
7.2 Operator, contractor and end user training	Identify training needs.	Update training for CCP response procedures in 2018-19.	Training has been updated and the rollout has commenced.
9.1 Validation of processes	Validate processes and procedures to ensure they control hazards effectively.	Update validation report to include finalisation of helminth study and provide further detail on critical limit basis. Report to be submitted to NSW Health and Department of Primary Industries in 2018.	The validation report has been updated and provided to stakeholders.
10.1 Recycled water quality management plans	Documentation of all aspects of recycled water quality management.	Update the corporate and scheme specific management plans during 2018-19 to ensure completeness.	Recycled water quality management plans have been updated and provided to stakeholders.
11.1 Long-term evaluation of results	Collect and evaluate long-term data to assess performance and identify problems.	Create a schedule for the analysis and long term review of recycled water performance during 2018-19.	Recycled water trend analysis now forms part of monthly operational meetings.
11.2 Audit of recycled water quality management	Establish processes for internal and external audits.	Use the completed gap analysis to review recycled water management using the AGWR framework assessment tool Requality.	Requality has been updated and improvement areas identified.



2.2.4 Proposed recycled water quality management activities and programs

Proposed measures to improve recycled water quality management in the future are outlined in Table 2-23.

Table 2-23 Proposed recycled water activities and programs

AGWR Framework sub-element	Recycled water objective	Activity / program	Scope / expected outcomes / timetable
2.4 Hazard identification and risk assessment	Undertake a risk assessment.	Identify and document hazards and hazardous events, estimate the level of risk and determine preventive measures.	Review and update risk assessments.
3.2 Critical control points	Document the critical control points (CCP), critical limits and target criteria.	Finalise SCADA updates following proposed CCP updates.	Finalise controls related to CCP's limits.
5.1 Verification of recycled water quality	Recycled water quality monitoring	Update the Recycled Water Quality Monitoring Plan	Review and update the plan to include new requirements for monitoring
6.2 Incident and emergency response protocols	Document incident protocols	Update Recycled Water Incident Notification and Response Procedure	Update to include dual reticulation protocols.
6.2 Incident and emergency response protocols	Test incident protocols	Perform a mock incident.	Test the incident protocols by completing a mock incident scenario.
10.1 Recycled water quality management plans	Documentation of all aspects of recycled water quality management	Complete the recycled water quality management plans for the dual reticulation project.	Bring together all aspects of recycled water management for the Chisholm and Gillieston Heights schemes.



2.2.5 Continual improvement in 2018-19

Recycled water quality improvement initiatives are documented in the Recycled Water Quality Improvement Plan (RWQIP) and prioritised and reported through the monthly cross-divisional recycled water quality meeting as a standing agenda item. Example improvements that were conducted over this period include:

- Review of the Recycled Water Quality Management System using Requality
- Review of the Hunter Water Recycled Water Validation Report
- Review of CCP's.

The monthly recycled water quality meetings also consider factors such as:

- quality and supply issues
- audit outcomes
- training
- monitoring and reporting

Findings and actions from the recycled water quality meetings are communicated to and reviewed by senior management on an as required basis.

The performance and effectiveness of the RWQMS is also reported to, monitored and reviewed by the Executive Management Team (EMT) as part of the formal quarterly strategic risk driver analysis update. The update monitors key risk profiles and also identifies needs for change, including where additional capital and operating expenditure may be required.

Findings, results and reports from IPART's operational audit are reviewed by the EMT and action plans developed for addressing recommendations and findings, including allocating additional resources as required. Key EMT members are involved in quarterly liaison meetings with NSW Health to review the effectiveness of the RWQMS and discuss operational issues.

We ensure resources are dedicated to the development, review and implementation of the RWQMS through our recycled water quality meetings and a dedicated RWQMS coordinator. All Hunter Water management, employees and contractors involved in the supply of recycled water are responsible for understanding, implementing, maintaining and continuously improving the RWQMS.

2.2.6 Significant changes to the recycled water quality management system

We proposed new CCP's for the Chisholm and Gillieston Heights recycled water schemes. These were documented in the Chisholm and Gillieston Heights Recycled Water Scheme RWQMP. Also, based on findings from IPART's 2017-18 operational audit, we have proposed changes to our RWQMS, specifically changes to current CCPs and consequent updates to the site-specific RWQMPs. We notified stakeholders of these proposed changes and continue to liaise with NSW Health to finalise the RWQMPs.

2.2.7 Non-conformances with the Recycled Water Quality Management System

There were no non-conformances with the Recycled Water Quality Management System during 2018-19.



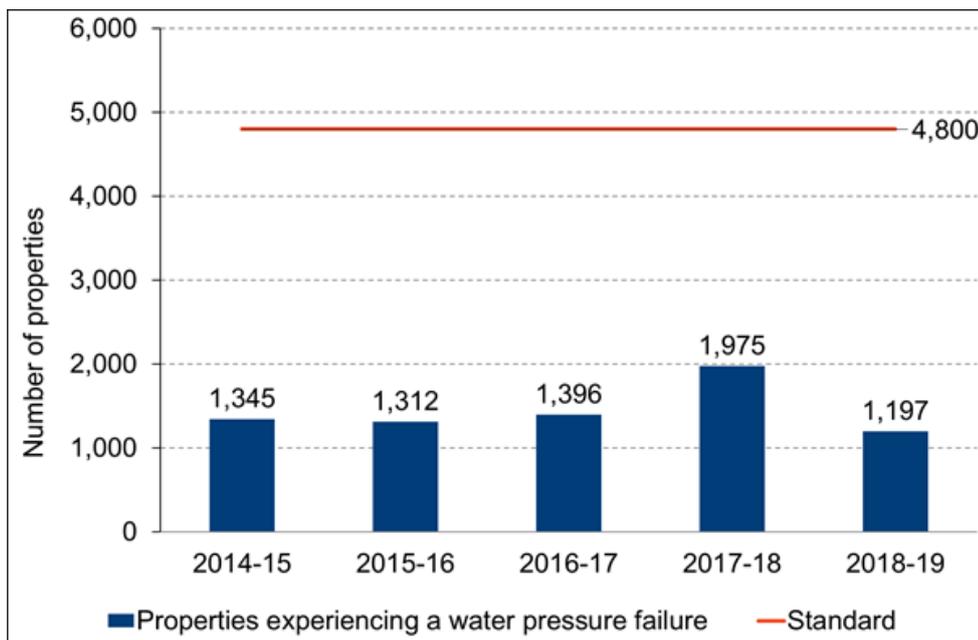
2.3 System performance standards

The Operating Licence sets the service levels that customers can expect from Hunter Water in three core areas: water pressure, water continuity and sewer overflows. Performance against licence limits is described below. Five year results for these metrics are presented in Figure 2-4 to Figure 2-8.

2.3.1 Water pressure standard

Hunter Water must ensure that no more than 4,800 properties experience a water pressure failure in a financial year.⁶

Figure 2-4 Water pressure failures



Note: Data for 2017-18 has been revised (from 2,487) due to an error in reporting, and therefore does not align with data reported in Hunter Water's 2017-18 Compliance and Performance Report.

We met the performance requirement of this standard for 2018-19, with a total of 1,197 properties experiencing low pressure, which is significantly below the limit of 4,800.

The number of properties affected in 2018-19 was lower than the previous four years. Exceptionally warm weather in January 2018 resulted in a maximum daily demand figure of 331 ML/d for the 2017-18 period resulting in low pressures across our network. The maximum daily demand figure for the 2018-19 period dropped significantly to 298 ML/d reducing low pressure impacts in our network.

Water pressure failures occur for a range of reasons including:

- Customer water usage during periods of high water demand, which can be seasonal (i.e. higher demands in summer compared to winter), diurnal (peak demand periods in morning and evening) and weather related (e.g. during periods of extreme hot and dry weather).
- Location of customer properties, including properties that are located close to water network reservoirs and therefore do not have sufficient elevation difference between the property and the reservoir.

⁶ NSW Government, 2017, Hunter Water Corporation Operating Licence 2017-2022, Clause 3.3.1



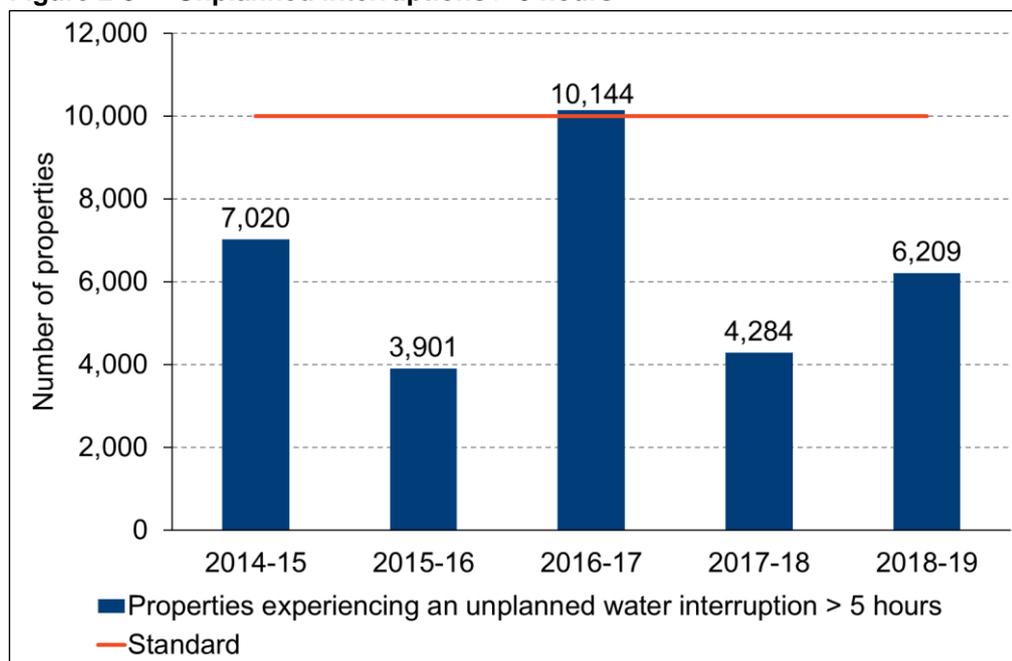
- Network design and configuration, such as older parts of the network that were not designed to current standards or areas where water demand has increased over time with increased development ahead of system upgrades.

2.3.2 Water continuity standards

Hunter Water must ensure that in a financial year:⁷

1. No more than 10,000 properties experience an unplanned water interruption that lasts more than 5 continuous hours; and
2. No more than 5,000 properties experience 3 or more unplanned water interruptions that each lasts more than 1 hour.

Figure 2-5 Unplanned interruptions > 5 hours



We met the performance requirement of the water continuity standard for 2018-19, with a total of 6,209 properties experiencing unplanned water interruptions exceeding five hours compared with the limit of 10,000.

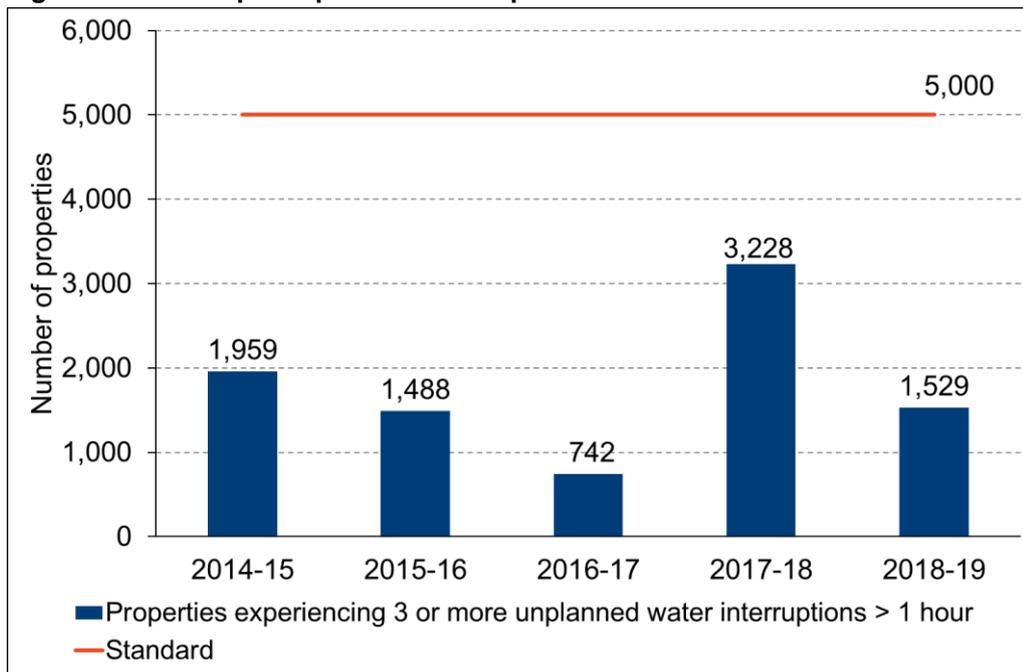
Our performance in 2018-19 was consistent with the rolling five year average. Performance in 2018-19 deteriorated compared to 2017-18 due to an increase in the occurrence of large trunk water main breaks.

Watermain breaks are the main contributor to unplanned supply interruptions and can occur as a result of asset condition and performance as well as weather conditions. The number of properties impacted by an unplanned water interruption is influenced by network configuration. The duration of the unplanned water interruption is affected by the location and complexity of the required repair, resource availability, job prioritisation, and the condition of and access to valves.

⁷ NSW Government, 2017, Hunter Water Corporation Operating Licence 2017-2022, Clause 3.3.2



Figure 2-6 Multiple unplanned interruptions



We recorded 1,529 properties that experienced 3 or more unplanned outages during 2018-19. The result was below 14% below our 5-year average for this measure and well below the limit of 5,000.

A significant increase was seen in 2017-18 which was primarily due to several repeat interruptions which each affected a large number of customers.

We manage our performance through water mains replacements. The water mains to be replaced are determined through analysis of water main failure history and modelling, so that the likelihood of repeat events is mitigated in the future.

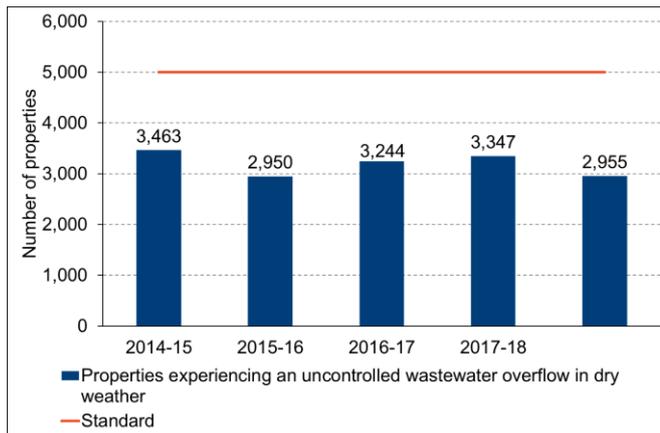


2.3.3 Wastewater overflow standard

Hunter Water must ensure that in a financial year:⁸

1. No more than 5,000 properties (other than public properties) experience an uncontrolled wastewater overflow in dry weather.
2. No more than 45 properties (other than public properties) experience 3 or more uncontrolled wastewater overflows in dry weather.

Figure 2-7 Wastewater overflows



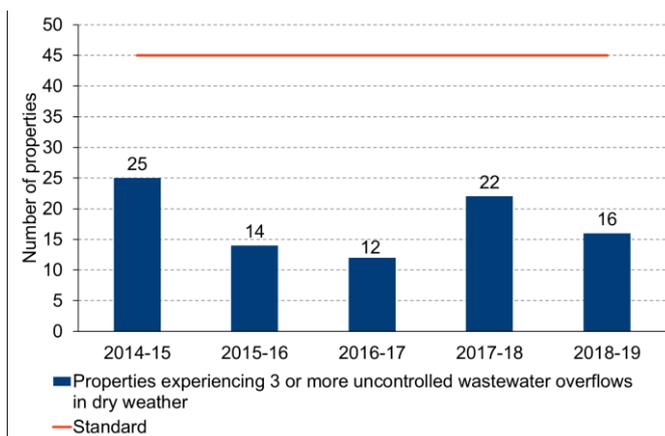
Note: Minor revisions have been made to data for 2014-15, 2015-16 and 2017-18 due to a reporting error and therefore does not align with data reported in Hunter Water's 2017-18 Compliance and Performance Report.

Commentary

Dry weather overflows affecting private properties were slightly lower than the rolling five year average. The number of incidents is comparable with the past four years and is significantly lower than the standard.

Factors influencing dry weather overflows include asset condition, as well as periods of extended periods of dry weather where tree roots enter sewerage mains and cause blockages.

Figure 2-8 Multiple wastewater overflows



Commentary

This indicator measures repetitive impact to private properties.

Multiple overflows affecting private properties were slightly lower than the rolling five year average and have decreased compared to 2017-18. The number of incidents remains significantly lower than the standard.

⁸ NSW Government, 2017, Hunter Water Corporation Operating Licence 2017-2022, Clause 3.3.3



3 WATER CONSERVATION

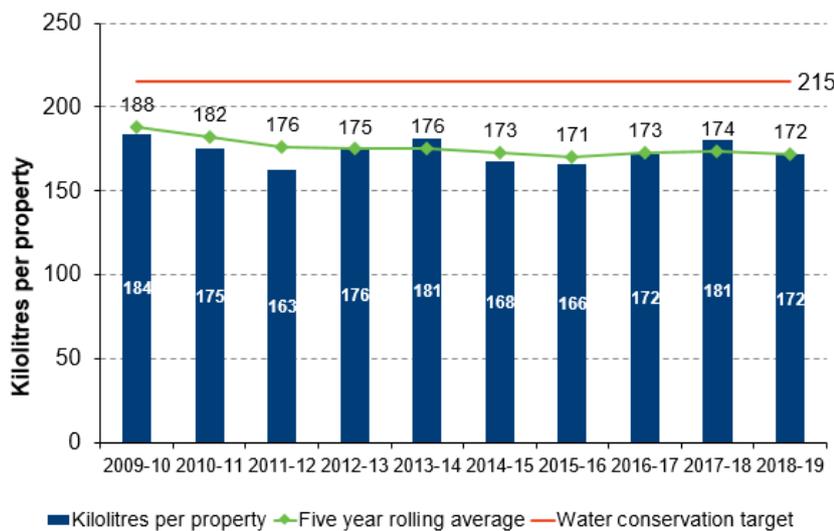
This chapter reports on compliance with our water conservation target for residential water use and provides information on the water conservation projects undertaken in 2018-19 and planned for the future.

It also includes an estimate of the maximum reliable quantity of water that Hunter Water can supply from one year to the next from our existing water storages based on the yield definition and methodology developed as part of the 2014 Lower Hunter Water Plan (LHWP).

Our water conservation work program for the next 5 years is provided separately in our 2018-19 Water Conservation Report.⁹ This report details water saving projects and activities that we are proposing to advance and place in an efficient portfolio response in the context of our Economic Level of Water Conservation (ELWC) methodology, which was approved by IPART in March 2019.¹⁰ It addresses opportunities and activities in the upstream ('catchment to treatment plant') and downstream ('treatment plant to consumer') parts of our water network.

3.1 Performance against the water conservation target

Figure 3-1 Ten year trend in residential water use



Hunter Water has a water conservation target in our Operating Licence requiring that the five year rolling average for annual residential water consumption is equal to or less than 215 kilolitres per year for each residential property. We achieved the water conservation target in 2018-19.

Residential water usage is shown in Table 3-1 and Figure 3-1. Historical water consumption per capita and per property varies each year, primarily due to the weather. The five year rolling average water consumption smooths out the effects of weather.

Table 3-1 Annual residential water use

	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Kilolitres per property	181	168	166	172	181	172
Five year rolling average of above	176	173	171	173	174	172
Kilolitres per person	70	65	65	68	74	70

* Five-year rolling average for 2017-18 has been revised from 173 to 174 due to a previous rounding error.

⁹ <https://www.hunterwater.com.au/About-Us/Publications/Reports-Other-Reports/Reports-Other-Reports.aspx>

¹⁰ IPART conditionally approved Hunter Water's proposed ELWC methodology in a letter dated 7 March 2019 (IPART ref. D19/4189), subject to applying an option value for water set to zero until the practical implications of option value have been more fully analysed and understood.



The decrease in household water consumption in 2018-19 is likely due to a combination of behaviour change and seasonal patterns. There are indications that increased customer engagement through the Love Water Campaign may be having an impact on residential demand. At the same time, a wetter and slightly cooler than average spring likely contributed to an overall reduction in outdoor demand for the year.

The five year rolling average water consumption remained relatively static after generally trending downward between 2006 and 2016. Further research is required to understand this flattening off in water conservation gains, but it may be due to the market for water efficient appliances becoming saturated as old inefficient models and fittings have been replaced over time.

3.2 Projects undertaken to achieve the water conservation target in 2018-19

The water conservation target is based on residential water use and during 2018-19 we continued to build on and seek innovative approaches to engaging with our community about water conservation. We have also implemented water conservation programs that target leakage and consumption by non-residential customers.

3.2.1 Water loss management

We can influence water losses from our distribution network through operational practices, planning and better use of technology. In 2018-19, Hunter Water further increased our active leak detection program, surveying over 5000km of mains (more than 100%) across our water network. Other works related to loss management included:

- Reservoir Repairs – further work was undertaken to rehabilitate the concrete floor of the Black Hill Reservoir to provide a better seal across leaking joints. Repair works were commenced on Four Mile Creek and Toronto 2 Reservoirs.
- Watermain replacement program – ongoing replacement of reticulation mains with history of multiple breaks or leaks recorded.
- Water service replacement program – ongoing replacement of service mains (pipe located between the reticulation main and customer meters) that have previously failed.
- Pressure management (seasonal) – system pressures are being reduced across two water supply zones during low demand periods (cooler months) which helps reduce leaks and main breaks in these zones.
- Pressure management (permanent) – an updated strategy was completed which included a proposed program of works for the implementation of further pressure management zones. This program has been included as proposed expenditure for 2020-25 in our recent pricing submission (lodged on 1 July 2019).
- District Metered Areas – ongoing installation of flowmeters has been undertaken to increase the coverage of District Metered Areas to 25% of the network in 2018-19. Monitoring of these areas helps to reduce water loss through the early identification of leaks and breaks. A strategy was undertaken which included a proposed program of works for increased network coverage. This program has also been included in our recent pricing submission.

These programs contributed to the Infrastructure Leakage Index (ILI) decreasing from 1.23 to 1.15 and real losses from 3.9 to 3.6 kilolitres per day per kilometre of watermain.

A fleet of 32 temporary data loggers was deployed during the year to help identify leaks at Hunter Water sites and on customer assets including hospitals, schools, council and commercial sites. This is in addition to the 81 permanent data loggers rolled-out across major and large industrial and commercial customers and the 78 schools that have previously had loggers permanently installed to assist with the early detection of leaks. Realised savings of 183 ML were achieved during the year through the repair of leaks and faulty valves and operational improvements as a result of this initiative.



3.2.2 Water efficiency

Nine large industrial/commercial customers participated in a detailed water audit of their businesses in 2018-19. Specialised audits of five council swimming pools were also completed. These audits realised 168 ML of water savings that were achieved through improved operational processes, leak repairs, fittings upgrades, cooling tower and irrigation system improvements and the use of alternative water sources.

The residential water audit trial saw 175 residential customers with high consumption (more than four times the average) or unusual increases in their consumption proactively contacted during 2018-19. The possible reasons for high consumption were discussed and plumbing audits and minor repairs were offered to assist them achieve estimated total savings of 15 ML.

3.2.3 Community engagement and partnerships

We have continued to engage with the community, building partnerships to increase awareness and promote water conservation behaviours. Table 3-2 includes details of the types of programs and projects completed by Hunter Water during 2018-19.

Table 3-2 Water conservation community engagement programs and partnerships in 2018-19

Description	Actions in 2018-19
Love Water campaign	<p>Love Water - our water conservation campaign - has primarily focused on residential consumers. It has sparked curiosity and consideration of how we use water in our community. It has encouraged water-wise behaviour, engaging deeply with our community as we learn together, and has got people talking about water. We have early indications of changing consumer's water behaviour through the emotive messages used in the campaign.</p> <p>Hunter Water has continued its reach with the Love Water campaign. Results have indicated that a behaviour change is contributing to a 3.5% reduction in water consumption, climate consideration removed. An online Love Water pulse-check survey indicated that 59% of the 424 respondents are aware of our water conservation campaign. Around half of the respondents felt that they were using less water after they had seen or heard about Love Water.</p>
Education program	<p>Our new education program, Learning Together to Change Our World, challenges students to tackle the real world problem of water scarcity and come up with solutions to help our communities save water through inquiry-based learning. The goal has been to engage in collaborative learning journeys where we support learnings in curiosity, creativity and innovation that reach across the community.</p> <p>More than 5,000 children learnt about water from our Bubbles and Squirt Water Saving Show that incorporates tips on how to 'love' water and where their water comes from. These shows are performed at primary schools and preschools in Hunter Water's area of operations.</p> <p>These programs together allowed us to engage with 6,500 children in our area about water conservation.</p>
Hunter Water website	<p>Our website includes a dedicated 'Save Water' section that provides information on how to be water efficient in the home and garden with new information added to compliment the Love Water objectives (http://www.hunterwater.com.au/Save-Water/Save-Water.aspx). Over the past year, 227,715 people have accessed the water usage calculator to find out how much water they are using. This is an increase of 6% and the Love Water page had an increase of 67% from the previous year.</p>
Community events	<p>We had an active presence at conservation and sustainability focused community events across the region, with a combined attendance of more than 100,000 people.</p>
Media – awareness raising	<p>We regularly emphasised the need for residents to be water efficient in media messaging over the year, led by messaging from our Love Water campaign. This was actioned by content that linked dam levels to usage levels, coupled with messaging on how residents can save water at their home. We launched television commercials in late 2018, supported by radio and print advertising as well as regular editorially gained content in mainstream media, as well as ramping up our social media presence by launching our LinkedIn and Instagram channels (to support our Facebook channel).</p>



Description	Actions in 2018-19
Community funding program	In 2018-19, we supported 36 key community impact programs to help raise awareness of water conservation. Partnerships included working collaboratively with local conservation organisations such as Port Stephens Koalas to educate the community on the importance of the environment and the impact that community behaviour has.
Support of WELS	We continued to support the Water Efficiency Labelling Scheme (WELS) for household appliances by including information on WELS under the 'Save Water' section of the Hunter Water website and through our customer communications. In addition, Hunter Water attended several community events to promote and encourage householder uptake of water efficient products.
Smart water advice	Ongoing participation in the Smart Approved WaterMark program has meant that we have been able to adopt, embed and link to the latest best practice water efficiency advice on our website.

All of these activities rely on consumers acting on better awareness of water efficient products and behaviours. We are working with the University of Newcastle to better understand the barriers and motivations for consumers to adopt water conservation behaviours. The first phase of this research project commenced in 2018-19 with a series of focus groups made up of representatives from four of our key customer segments. The outcomes from the project, which will be completed in late 2019, will allow us to better tailor and target water conservation messaging and support for our customers.

3.3 Proposed water conservation projects

Hunter Water intends to continue to take an integrated approach to water conservation, working with customers and the broader community to reduce leakage and use water more efficiently. Further details on this approach and the water conservation work program for the next five years can be found in the Water Conservation Annual Report.¹¹

3.3.1 Water loss management

The following leakage reduction projects and programs are planned for implementation in 2019-20:

- Ongoing leak detection survey of the water distribution network.
- Lining and repair of Toronto 2 and Four Mile Creek Reservoirs.
- Replacement of the 900mm diameter water main between Tarro and Duckenfield.
- Ongoing use of temporary data loggers to assist customers with the identification of large internal leaks.
- Expansion of the intelligent water network monitoring project to cover approximately 35 per cent of our distribution system.

¹¹ <https://www.hunterwater.com.au/About-Us/Publications/Reports-Other-Reports/Reports-Other-Reports.aspx>



3.3.2 Water efficiency

Water efficiency management plans will continue to be rolled out to all large water customers during 2019-20. Ten detailed water audits will also be completed with large commercial/industrial customers to identify opportunities to reduce potable water use in their operations. A series of specialised audits focusing on holiday parks are also planned.

A 'Water Check Up' or plumbing audit will be offered to up to 100 residential customers each year. Customers with leaks identified during the network leak detection survey or with unusually high consumption will be proactively contacted to identify the source and to repair leaks on their property. Alternatively, targeted advice will be provided where the high consumption appears to be more behaviour-related or requires more substantial investment.

The data from our pilot 'Rainwater Tank Tune' program that was commenced at the end of 2018-19 will be analysed and used in the design of a more permanent program that will aim to improve the maintenance and functionality of rainwater tanks installed by customers.

A project to substitute various points of potable water usage at Burwood Beach and Boulder Bay wastewater treatment works with recycled effluent will be completed.

3.3.3 Community engagement and partnerships

We plan to continue with and build on all of our existing community engagement and partnership programs during 2018-19. This includes the water conservation research project with the University of Newcastle and reaching out to local councils and bulk housing managers such as NSW Housing, Compass Housing and Defence Housing to identify opportunities to improve water conservation through improved asset management and engagement with the communities they service.

3.4 Reliable quantity of water available from existing storages (yield)

The NSW Department of Industry (then Metropolitan Water Directorate) led a whole-of-government approach to developing the Lower Hunter Water Plan (LHWP) which was released in April 2014. A key driver for the LHWP was to ensure water security during drought and reliable water supplies to meet the needs of a growing population and business activity.

An important part of the LHWP planning process was to define the level of service standards, such as the maximum acceptable frequency and duration of water restrictions and the risk of reaching critically low storage levels. The maximum amount of water that can be supplied each year without exceeding the level of service standards is referred to as the 'yield'.

Since the release of the 2014 Lower Hunter Water Plan, Hunter Water calculates yield in accordance with the methodology that was developed in the LHWP. This methodology was endorsed through the governance structure of the 2014 LHWP.

Current modelling indicates that the Lower Hunter storages can supply an average of 76 billion litres of water each year without exceeding the 2014 LHWP level of service standards. The level of service standards were:

- Frequency of restrictions not to be more than once in 10 years on average.
- Duration of restrictions to be not more than five per cent of the time.
- The chance of reaching a very low level of storage that is near empty to be not more than one in 10,000.

The level of service standards, and the associated yield, are to be reviewed with each major update of the LHWP. The first major update of the plan is currently underway.



4 ORGANISATIONAL SYSTEMS MANAGEMENT

This chapter provides an overview of the performance of three of our management systems in 2018-19: Asset Management System (AMS), Environmental Management System (EMS) and Quality Management System (QMS). For each management system, we report on the programs and activities completed during the year and the outcomes of these activities. We also report on: proposed future programs and activities, any significant changes made to the systems, and any major non-conformances during 2018-19.

4.1.1 Overview of Hunter Water's Asset Management System

Our physical assets comprise water, wastewater, recycled water and stormwater systems that are important in ensuring delivery of effective, efficient, and high quality services. Given the asset-intensive nature of the organisation, asset management is critical in determining the level of service provided to customers, compliance with regulations that aim to protect the environment and human health, the cost of services and also our efficiency and financial performance.

The objective of the asset management system is to ensure that we have in place the framework, processes, procedures and resources needed to effectively manage physical assets to support the achievement of business objectives.

Our 2017-2022 Operating Licence requires that we maintain and implement an AMS to ensure that our assets continue to fulfil their intended functions. The Operating Licence requires us to develop an AMS by 31 December 2017 that is consistent with the Australian Standard AS ISO 55001:2014. The AMS was to be fully implemented by 1 July 2018. This was accomplished as required during the 2017-18 year, with external verification of this achievement demonstrated through certification.

Hunter Water is the first urban Australian water authority to be certified to the new ISO 55001:2014 standard. This asset management system provides the framework to optimally manage asset lifecycles to achieve the agreed outcomes for customers, the environment and the community.

ISO 55000:2014 describes an asset as: *"an item, thing or entity that has potential or actual value to an organisation"* and that: *"asset management is the coordinated activity of an organisation to realise the value from its assets"*.

Effective asset management is essential to providing services in the most cost-effective manner and demonstrating this to customers, regulators and other stakeholders. The organisational benefits of asset management include:

- improved governance and accountability
- enhanced service management and customer satisfaction
- improved risk management
- improved financial efficiency and affordability for customers
- sustainable creation and operation of assets

The asset management system is one of five certified management systems within Hunter Water's overall integrated management system (along with safety, environmental, quality and information security). The key elements of ISO 55001 are:

- organisational context and leadership
- planning
- operation
- performance evaluation
- improvement



Our asset management system is guided by both our Asset Management Policy and Strategic Asset Management Plan. These strategic plans provide guidance on our asset management principles to:

- Enable the sustainable growth of the region.
- Provide safe, high quality and affordable services to the community.
- Provide a resilient water supply that withstands drought and enables growth.
- Take a responsible and sustainable approach to the protection of the environment and public health.
- Seek innovative solutions and challenge traditional methodologies across the asset life cycle.
- Understand customer, consumer and community needs and expectations.
- Comply with all legislative and regulatory requirements.
- Minimise customer prices and ensure financial sustainability.
- Maximise investment grade credit rating.
- Ensure a workforce that embraces learning, innovation and change.

The scope of our asset management system incorporates both the physical assets and asset lifecycle processes required to provide water, wastewater, recycled water and stormwater drainage services. The following assets are covered by the asset management system: raw water, treatment, water network, wastewater network, recycled water, stormwater, electrical, and telemetry and SCADA.

4.1.2 Asset management activities and programs, 2018-19

During 2018-19, we successfully completed an ISO 55001:2014 surveillance audit of our certified asset management system. In addition, an internal audit was conducted focusing on our critical assets and capital portfolio management.

Prior to Hunter Water achieving certification, we have historically implemented asset management activities and have been involved in both water industry assessments (Aquamark and WSAA) and broader asset management industry learnings (Australian Asset Management Council). However, the ISO 55001 transition required movement beyond technical lifecycle activities to a management system approach which incorporates strategic alignment, document control, competency, communication and awareness.

Therefore, the asset management system initiatives undertaken through 2018-19 include a combination of improved management system, governance and system processes and procedures. Key activities and the results/outcomes of these activities are described in Table 4-1.



Table 4-1 AMS - Activities and programs completed in 2018-19

AMS Initiative	Activity / Program	Results / Outcomes
Asset management system	AMS surveillance audit	During 2018-19, we successfully completed an ISO 55001:2014 surveillance audit of our certified asset management system.
	Asset management leadership	We have initiated an asset management review (executive managers) in which the strategic elements of the AMS are reviewed and improvement initiatives assessed and implemented. In addition, the asset management steering committee (group managers) is maintained and continues to review key areas for improvement at a technical level.
	Critical assets audit	Internal audit was conducted focusing on our processes for managing critical assets.
	Capital portfolio	Internal audit was conducted focusing on our capital portfolio management.
	Technical change	Through the AMS transition, we have refined and implemented both an organisational change and technical change process to effectively manage risks.
	Enterprise risk management	We have improved the enterprise risk management framework with inclusion of updated risk appetite statements for the nominated risk profiles. The AMS has reviewed and incorporated these objectives within its approach to asset risk management.
	Strategic directions	Investment priorities aligned to IPART price submission.
	Stakeholder & community engagement	We are continuing to innovate in our approach to stakeholder, customer and community engagement, with a suite of initiatives. This includes the Love Water program. These initiatives are integrated into the AMS through asset planning/creation and managing operational community and customer impacts.
	Awareness and training	We have revised and updated our asset management awareness and training, which is undertaken through the employee induction process, as well as through staff and contractor training. Completed the e learning and tool box training for staff.
	Procurement	Asset management objectives have been included in our procurement arrangements through the contract management framework.
	Competency based training	Our Civil Maintenance and Intelligent Networks groups have both developed in-house Competency-Based Training modules to ensure that staff possess the various essential skills and competencies in each workplace environment ensuring high levels of customer service and work health safety.
	Dams	We are updating and improving our dam safety emergency monitoring procedures and plans, along with transitioning our systems towards the requirements of the new dams safety regulations.
	Civil Maintenance System application upgrade	Hunter Water's Civil Maintenance IT platform is in the process of an upgrade to ensure ongoing reliability and successful linkage to a wider hardware/software IT services initiative (FSM program).
Asset planning	Water resilience program	We are improving our planning for water security by expanding the planning philosophy to incorporate adaptive planning, scenario planning, systems thinking and opportunity thinking principles related to water conservation, integrated water cycle management and water source augmentations.
	Sustainable wastewater	We are expanding our traditional wastewater planning to consider medium and long term opportunities for potential waste to energy solutions, improved biosolids management, recycled water systems and carbon neutrality.



	Planning to support both five and ten year investment portfolio	Planning work initiated and underway for IPART price submissions.
	Energy strategy	An energy strategy has been developed which will guide the organisation to be more energy efficient.
	Climate change adaptation strategy	Hunter Water is a business that is inherently impacted by climate and weather and have consequently developed experience in managing extreme events associated with these variables. We have refined our Climate Change Adaption Strategy which utilises adaptive pathway thinking to guide its approach to climate change adaptation.
	Growth plan	Our growth plan is updated annually to reflect the latest connection growth information and development forecasts ensuring that developers, planners and the broader community can reference up-to-date information.
	Climate adjusted demand forecast	We have undertaken detailed analysis of daily water demand records and correlated these with climatic variables to produce climate-adjusted demand forecasting models.
	Borefields (Groundwater Source) Management Plan	A comprehensive review and update of our borefields (Groundwater Source) Management Plan has been completed. This plan includes asset condition assessments and preventative maintenance tasks now underway in an implementation phase.
Investment management	Strategic planning	We have revised the strategic investment process through the implementation of strategic cases and program business cases, including the use of Investment Logic Maps.
	Better Business Cases	We have implemented the Better Business Case model which uses a 'five case' framework consisting of a strategic, economic, commercial, financial and management case.
Asset standards	Design codes	We have updated both the water supply code and the sewerage code (Hunter Water editions).
	Standard technical specifications	We have updated or created standard technical specifications for SCADA and automation equipment, lifting equipment, pressure equipment, chemical storage and delivery systems, work as constructed information, and preparation of civil, structural and mechanical engineering drawings.
	Approved products	The electrical and civil approved products within our asset portfolio have been updated.
Asset creation	Resource strategy	The project and contract management forward program was reviewed and we have implemented a resource strategy which involves engagement of a program and project management support contract.
	Major Projects Group	The Major Projects Group was formed to support capacity to deliver the capital investment portfolio and improve capability across the business.
	Capital portfolio	Reviewed and prioritised our capital portfolio to meet our combined 2017+3 Strategy and asset management objectives.
	Asset renewal	Reviewed and updated the forecast asset renewal investment to meet business objectives including the risk appetite statements

4.1.3 Proposed asset management activities and programs

We will continue to review and improve our asset management system to meet defined asset management objectives. The asset management system initiatives planned to be undertaken through 2019-20 include a combination of improved management system, governance and system processes and procedures. The key initiatives are described in Table 4-2.



Table 4-2: AMS – proposed activities and programs

AMS Initiative	Activity / Program	Results / Outcomes	Timetable
Asset management system	Business planning	Update of Product Plans to reflect whole of business context.	March 2020
	Asset class plans	Continue rolling review, update and consolidation of our asset class plans in accordance with Hunter Water's document control system.	May 2020
	Competency and Training	Develop asset management Competency-Based Training modules to ensure that staff possess the various essential skills & competencies in each workplace environment ensuring high levels of customer service and work health safety.	May 2020
	Leadership	Continue to implement and embed management review through planning & coordination of both the executive management review and asset management steering committee.	Ongoing
	AMS objectives	Hunter Water will consult and agree on an asset management plan hierarchy, which will compile the operational, maintenance and renewal actions and costs to implement the corporate objectives defined in the Strategic Asset Management Plan (SAMP).	May 2020
	Document Management System	All necessary documents will be updated and captured through the new document control standard and system (Integrum). Documents will also have document control tables consistent with the Hunter Water document control standard.	May 2020
	AMS internal audit	The AMS inspection program will be updated to include an annual process inspection schedule, where a staff member will check the alignment between the Asset Management Plans and the operation and maintenance schedules.	Mar 2020
	Root Cause Analysis	Review and revise the Incident Management Standard to ensure consistency for management of (non-conformance reports (NCRs).	Nov 2019
	Competency training	A structured approach will be taken to thoroughly review the existing training needs analysis, the training need matrix and a centralised LMS (learning management system) will be developed.	Oct 2019
	Asset investment	Investment management	Finalise all our identified strategic cases and program business cases associated with a 5-10 year planning period.
Asset Planning	Critical assets	Review and update the critical asset program incorporating the enterprise risk management framework and risk appetite statements for all asset classes.	Mar 2020
Asset Information	Information standards & process	A review of our asset information standards and collection processes is underway as part of continuous improvement.	Jun 2020



4.1.5 Significant changes to the Asset Management System in 2018-19

Following a transition of our asset management system to be consistent with ISO 55001:2014 through 2017-18, during 2018-19 we successfully completed an ISO 55001:2014 surveillance audit of our certified asset management system.

Our enterprise risk management (ERM) framework was recently updated to include risk appetite statements and improvements to the risk rating matrix and likelihood table. Risk appetite statements were defined for specific business risks associated with elements of the Asset Management System. Asset-related risks are now being managed in accordance with the updated ERM.

4.1.6 Non-conformances in the Asset Management System and actions taken to resolve

There were no major non-conformances with our asset management system in 2018-19. However, the 2019 surveillance audit of our AMS identified minor non-conformances that have been incorporated as improvement initiatives through 2019-20. These include:

- Hunter Water will consult and agree on an asset management plan hierarchy, which will compile the operational, maintenance and renewal actions and costs to implement the corporate objectives defined in the Strategic Asset Management Plan (SAMP).
- All necessary documents will be updated and captured through the new document control standard and system (Integrum). Documents will also have document control tables consistent with the Hunter Water document control standard.
- The AMS inspection program will be updated to include an annual process inspection schedule, where a staff member will check the alignment between the Asset Management Plans and the operation and maintenance schedules.
- Review and revise the Incident Management Standard to ensure consistency for management of non-conformance reports (NCRs).
- A structured approach will be taken to thoroughly review the existing training needs analysis, the training needs matrix and a centralised LMS (learning management system) will be developed.



4.2 Environmental Management System (EMS)

Clause 4.2 of our Operating Licence stipulates that Hunter Water must maintain and implement an environmental management system that is consistent with the *Australian Standard AS/NZ ISO 14001:2016 Environmental Management Systems – requirements with guidance for use*.

Our Environmental Management System (EMS) provides a framework for developing, implementing, monitoring and reviewing our objectives, actions and targets in relation to our commitment to the community and environment. We have been externally audited and certified against the ISO Standard, demonstrating our compliance with Clause 4.2 of our Operating Licence.

4.2.1 Environmental Management Plan

The development and implementation of an Environmental Management Plan (EMP) is a key component of our EMS. The EMP outlines our environmental objectives, program of actions and targets to manage risk and drive environmental improvements for the organisation.

The EMP is reviewed and updated every two years. Our current 2018-2020 EMP was approved by our Board of Directors in February 2018.

The 2018-2020 EMP is publically available on our website and has 21 key environmental objectives. These objectives guide organisational improvement and address our key responsibilities to the environment and community. Against each objective are one or more actions/programs, and set targets/indicators. The environmental objectives have been categorised into one of four initiative categories, as follows:

- water service initiatives
- wastewater service initiatives
- stormwater service initiatives
- business practice initiatives.

4.2.2 Key environmental management activities/programs in 2018-19, and beyond

Water service initiatives

Objective 1: Protection of drinking water catchments

Catchment management plan

During 2018-19 we undertook a number of catchment improvement programs in accordance with the revised Catchment Management Plan adopted in June 2018. The programs are aimed at addressing the highest risk aspects of source water management in accordance with the Australian Drinking Water Guidelines framework.

Key risks to the water supply system were found to be microbial contamination from human and animal sources, land erosion, agricultural runoff, public recreation access and future development. The main actions undertaken during 2018-19 were:

- Assessment of development applications and liaison with approval authorities when in drinking water catchments to identify and mitigate potential risks to water quality.
- School engagement project in partnership with Hunter Local Land Services to engage with local schools to improve awareness of the water cycle and need to protect catchments.
- Sustainable agricultural project to engage farmers in the Upper Chichester Valley in best practice farm management. This included: field days, training courses and monitoring dairy farms upgrades.
- Tillegra Riparian Improvement Project with the continuation of the five-year program of riparian buffer zone establishment, including delivery of off-stream watering and ongoing weed control.
- Environmental compliance project including site visits and audits of activities in the catchments.



Moving forward

The program of work will continue to be implemented in accordance with the Catchment Management Plan. Priority areas for future activities include erosion management in locations such as the Seaham weir pool, Upper Chichester and Campvale, sustainable agricultural management in upper catchment areas, environment compliance monitoring of high-risk land use activities and continuation of the current school engagement project.

Collection and assessment of water quality data

Baseline water quality monitoring was completed in late 2017. During 2018-19, water quality data for the Dungog water supply system was extracted and analysed. The outcome of this analysis identified that the frequency and severity of algal blooms in the Chichester system have increased in recent years. It was determined that trend analysis over a longer time period is required as part of the investigation into the causes of the blooms.

Moving forward

Following the outcomes of the analysis of data for the Dungog water supply system, the scope for the preparation of a source water quality report has been amended. The change in scope will allow trend analysis of a longer term dataset to better inform the cause of algal blooms.

Objective 2: Sustainable use of water resources

Compliance with water supply works and water use approvals

Over the reporting period, we operated in accordance with the water access and environmental flow requirements of our Water Supply Works and Water Use Approval Licence. Actions have been developed to facilitate the continual improvement of compliance with all aspects of the licence. Activities included:

- Installation of telemetered monitoring bores.
- Improvements in data collection and transfer to accurately forecast or identify areas of potential non-compliance.
- Extension of temporary licence amendment relating to the collection of dissolved oxygen at Chichester Dam for an additional six months.
- Additional automatic notifications and reports generated by monitoring systems to warn of potential non-compliances.

The above activities will provide additional controls to prevent non-compliance and add an additional layer of contingency.

Moving forward

We continue to plan for continuous improvements in our systems supporting the management of, notification and reporting on data collected for water management licence compliance. The following is planned for implementation in 2019-20:

- A chain of custody procedure to aid in notification and reporting, immediately notifying the catchment team if data is not collected or is outside water management licence limits.
- Improved licence compliance tracking with automated notification of exceedances.
- Create a streamlined and efficient water management licence data management system including restricting and centralising data collection and entry.
- Develop and update the water licence checklist to improve visibility of the licence.



Implementation of water efficiency programs

We have undertaken a range of water efficiency activities and programs during 2018-19. These activities, along with our proposed programs for 2019-20, are described in detail in Section 3.

Hunter Water has an established set of rules regarding water use called the Water Wise Rules. These rules have been in place since July 2014. Hunter Water has established processes by which breaches of the rules can be logged on the Hunter Water website. Breaches are followed up by an established process including letters and site visits, if required. Over the reporting period 81 water wise rules breaches were logged and tracked.

Moving forward

Hunter Water will continue customer education and promotional programs including 'Love Water' and our schools programs to encourage efficient water use to support water wise rules throughout 2019-20.

Lower Hunter Water Plan to define the long term strategy for water security and drought response

In 2018-19, work continued on the development of the second edition of the Lower Hunter Water Plan (LHWP). The LHWP identifies a mix of water supply and demand measures to ensure water security in drought, as well as reliable supplies to meet the region's longer term needs. The current program is on track to be completed by 2021. Relevant approvals from Hunter Water's Board and LHWP Governance Structure have been obtained including for LHWP goals and objectives, decision support framework, options shortlist, and yield methodology.

Work undertaken includes the development of shortlisted options including consideration of technical, environmental and social impact investigations. In addition a water conservation strategy has been developed with implementation commenced. A recycled water strategy has also been developed.

Implementation of a community engagement strategy commenced with Phase 1 deliberative forums focusing on community values held in October 2018 and Phase 2 deliberative forums focusing on community attitudes to option types held in June 2019.

Moving forward

We will continue to work on the development of the second edition of the LHWP. Actions moving forward include continued application of the decision support framework and option development, further community engagement, and portfolio development and analysis.

Reductions in non-revenue water

Non-revenue water is water that is supplied, but that we do not currently bill (receive revenue) for. It includes water used and lost during the activity of water and wastewater treatment, leaking infrastructure, errors in water meter readings and illegal connections. We have a program to reduce non-revenue water.

During 2018-19, a review of our Non-Revenue Water Strategy was undertaken. In addition, actions implemented include:

- active leak detection of 5000 kilometres of the water network
- lining Blackhill Reservoir
- lining Toronto 2 Reservoir
- commenced lining of Four Mile Creek Reservoir
- TaKaDu software expanded to cover 25 percent of the water network enabling better detection of events such as leaks and breaks.



Moving forward

We will continue to deliver initiatives in the future including active leak detection, development of customer meter replacement strategy, calibration of large bulk flow meters, implementation of water loss reduction strategy, and replacement of the Tarro to Duckenfield section of the Chichester Trunk Gravity Main and implementation of recycled water upgrades at various wastewater treatment plants.

Objective 3: A reduction in environmental and community impacts from watermain breaks

Water asset masterplan

A water asset resource plan is currently being developed which is aimed at reducing water main breaks. The target timeframe for finalising the plan is May 2020.

Moving forward

The development of this plan will continue and actions will be implemented.

Wastewater service initiatives

Objective 4: Undertake wastewater activities in a sustainable manner

Operate treatment plants in accordance with EPA licence requirements

Monitoring and reporting of the performance of Hunter Water treatment plants is stipulated by Environment Protection Authority licencing requirements. In 2018-19, Hunter Water completed monitoring and reporting via annual returns and monthly website publishing. There was no adverse compliance or enforcement action undertaken by the regulator.

Sustainable wastewater strategy

There are 15 recycled water schemes connected to Hunter Water's systems. A key strategic initiative to continue to identify opportunities to substitute recycled water for potable water has been the development of a recycled water strategy. In June 2019, our Recycled Water Strategy was endorsed by the executive management team. The objectives of the strategy are to:

- Establish a framework to guide decision-making on recycled water schemes, both from the perspective of the commercial value to Hunter Water and the broader community.
- Identify the characteristics of schemes that are most likely to provide a net environmental, social and economic benefit, and recommend how Hunter Water should respond to these opportunities.

The strategy identifies a planning and evaluation approach for recycling schemes and a number of specific initiatives that will be further developed.

Moving forward

Moving forward, development of initiatives will progress including:

- Developing tools and ready reckoners to support identification and evaluation of water recycling opportunities.
- Work with partners and stakeholders to assess the viability of recycled water schemes for open space irrigation.
- Continue to explore opportunities to expand industrial recycling schemes.
- Explore and develop agreed drought response measures.

Hunter Water will work with customers, community, stakeholders and government agencies to continue to understand the value of water in the urban environment and identify recycling opportunities.



Objective 5: Reduce environmental and community impacts from wastewater overflows

Investigation into impacts of overflows

During 2018-19, work continued on the Lake Macquarie Effects Based Assessment program, with modelling undertaken by NSW Office of Environment and Heritage. This project is investigating the impacts on the lake of wet weather wastewater discharges compared to impacts from stormwater inflows. Multiple impact factors are being considered, including environmental, human health and aesthetics. This study will allow us to assess the relative benefits of various wastewater network upgrades and prioritise upgrades which have the greatest net environmental benefit. The modelling work is due to be complete by early 2020.

Development of an inflow/infiltration reduction strategy for the Dungog wastewater system commenced.

Review of environmental impacts from sewer overflows and repeat sewer-overflows were undertaken. These reviews identified changes to the management of critical sewers, additional sewer mains to be added to the proactive inspection program and minor modifications to non-critical sewer renewal programs. Stage 1 of the performance assessment of preventative maintenance indicated decreased overflows but with a higher cost than reactive maintenance. Stage 2 has commenced.

Moving forward

Hunter Water will develop a decision-making framework for Lake Macquarie to determine an overflow reduction strategy. The model will be developed in consultation with key stakeholders and will inform overflow strategies for other catchments.

As part of the inflow/infiltration reduction strategy for Dungog, a program of work will be developed and implemented to reduce wet weather overflows and limit the scope of future capital work. This program of work is expected to be rolled out over a three year period.

Development of a non-critical sewer overflow strategy, wastewater pump station strategy, rising main replacement strategy and critical overflow strategy will continue over the next 12 months.

Wastewater management masterplan

A Hunter River Estuary model was completed in early 2019 and a consultant engaged to deliver the Hunter River Estuary Wastewater Masterplan.

Preliminary reporting of the outcomes of the model and early direction for the masterplan was submitted to the EPA on 12 July 2019 in accordance with a Pollution Reduction Program requirement. The outcomes of the model indicate that wastewater treatment plants are a relatively minor contributor to pollutant loads within the estuary, however are more significant contributors in tributaries.

Moving forward

Development of the masterplan will continue, being finalised over 2019-20. The masterplan will explore catchment interventions, infrastructure upgrades, bubble licencing and other approaches through an effects-based framework. It would involve engagement of stakeholders and consideration of catchment values.



Objective 6: Monitor the health of our waterways and beaches

Beachwatch program

Beachwatch (managed by the NSW Office of Environment and Heritage) is a program that monitors and reports on recreational water quality at swimming sites along the NSW coast. Each year (including 2018-19) we carry out sample collection and testing to provide input into the Beachwatch program. We also review and provide input into preparation of the annual Beachwatch Report.

Moving forward

Our involvement in the Beachwatch program will continue in the future. We plan to review our current sample collection and testing schedule to ensure the program continues to be fit for purpose in matching program requirements.

Objective 7: Improved performance against environmental compliance obligations

Environmental compliance improvement program

We have developed a compliance improvement strategy that highlights key actions to be undertaken in order to drive compliance improvements across the business. Good progress in completing actions has been achieved during 2018-19 with a large number of capital programs underway that will improve compliance risk for the organisation. This includes wastewater treatment plant upgrades, network upgrades and improvement of chemical storage and handling. During the reporting period there were no incidents or events that resulted in EPA enforcement or penalties.

Moving forward

Implementation of the capital program and strong focus on improving operational compliance will continue into 2019-20. There will also be a strong focus on reviewing Hunter Water's approach to environmental risk management and the delivery of compliance-related environmental training for staff.

Objective 8: A reduction in carbon emissions from wastewater treatment activities

Renewable energy from wastewater

During 2018-19, we completed a best practice review of renewable energy from biosolids and renewable energy from biosolids options study. Other actions undertaken included:

- Completing a preliminary market analysis for organics feedstock.
- Consultation with industry stakeholders including other water authorities.
- An assessment of dry digestion option for centralised stabilisation at Lake Macquarie.
- Sponsorship of a three year PhD project on zero emission sludge lagoons.
- Completion of a waste to energy case study for the Hunter.

The outcome of the investigations indicate that a centralised biosolids management approach may be cost-effective compared to a business-as-usual approach.

Moving forward

Work will continue with the completion of a renewable energy from biosolids issues analysis and renewable energy from biosolids risk assessment expected in late 2019.



Objective 9: Improved environmental outcomes from stormwater assets

Implementation of asset class stormwater management plans

During 2018-19, implementation of asset management actions included:

- Mayfield culvert construction.
- Dumaresq Street culvert replacement business case developed.
- Stormwater critical main and stormwater condition assessment annual provisions allocated and spent on programmed work.
- Munibung Creek rehabilitation business case completed.
- Ongoing maintenance of stormwater assets including floating booms, silt traps, tidal gates, stormwater treatment devices and mowing.

Moving forward

Implementation of the above will continue. In addition to these ongoing actions, information in the Stormwater Map will be updated to replace the Stormwater Asset Class Management Plan by late 2019 and implementation of actions.

Water sensitive urban design

Hunter Water has been engaging with stakeholders to review opportunities to improve water sensitive urban design. This has involved setting-up and holding a quarterly interagency working group (Councils excluding Dungog, Department of Planning and Hunter Development Corporation). Benchmarking against the Water Sensitive Cities Index has identified a ten-point action plan that our region could implement to create a more water sensitive region.

Moving forward

Continue to engage with stakeholders at quarterly working groups. Identify the highest priority actions from the Water Sensitive Cities benchmarking that all stakeholders could work together on.

Investigations into opportunities to naturalise stormwater assets

During 2018-19, the Stormwater Naturalisation study to identify possible areas for naturalisation work was finalised. A customer willingness to pay survey was completed to determine customer preferences and willingness to pay for stormwater amenity improvement work.

An application for a Newcastle Port Community Grant for amenity improvement works for the Lower Cottage Creek stormwater channel was successful.

Moving forward

Hunter Water will continue to develop the business case for Stormwater Amenity Improvement work and implement actions subject to funding being made available. The design for the Lower cottage Creek Amenity Work will be finalised by June 2020.



Business practice initiatives

Objective 10: The establishment of a work place culture that values sustainable work practices

Sustainability plan

Hunter Water is committed to playing its part in the realisation of the United Nations Sustainable Development Goals and is proud to be part of an industry that has made a strong collaborative commitment to progress all 17 objectives. The Sustainable Development Goals offer a new way of thinking that challenges the traditional 'business as usual' approach and with increasing adoption across the nation and globe, will result in better alignment with emerging government policy. During the reporting year, a number of key sustainability initiatives such as improvements in sustainable procurement and waste management were implemented in addition to the major focus on water resilience and the development of sustainable wastewater strategies discussed elsewhere in this report.

Moving forward

An overarching Sustainability Plan for the Corporation is yet to be developed but will be a focus in 2019-20. Hunter Water will also prepare a new Environment and Sustainability Management Plan which will outline key objectives and targets for the next five years. Individual programs relating to sustainability will continue to be developed and implemented during the year ahead.

Objective 11: Improved environmental work practices

Implement continual improvements programs for the Environmental Management System (EMS)

During 2018-19, Hunter Water completed three integrated audits for the EMS, WHS and quality management systems with high levels of compliance and only minor non-compliances identified across the three audits. The EMS was also subject to an audit by IPART as part of the 2018 Operating Licence Audit. The outcome was a grading of *Compliant (minor shortcomings)*

Moving forward

The integrated audit program will continue in 2019-20. The EMS is scheduled to be recertified against *AS/NZ ISO 14001:2016* in May 2020.

Objective 12: Relevant community and stakeholder consultation on environmental matters

Informing the community about Hunter Water's activities and impacts on the environment

We commenced our community engagement forums which aim to build our relationships with key stakeholders to educate the community about environment, water and planning topics. We engaged directly with 1,000 people at these events and hope to extend this next year.

Throughout the reporting period we had an active presence at conservation and sustainability-focused community events across the region with a combined attendance of more than 100,000 people.

We continue to consult with the community and stakeholders when developing major projects including through our website and targeted consultation. We continue to use *Your Voice*, our community engagement platform (www.yourvoice.hunterwater.com.au) encouraging community participation in initiatives across our entire organisation.

Love Water Campaign

The Love Water campaign has continued with early indications of changing consumer water behaviour. Details of this campaign are discussed in Chapter 3 and 5 of this report.



Moving forward

Over the 2019-20 reporting period, we will continue to promote the messages of the Love Water campaign. We plan to reach more of our community with our Love Water messaging to continue to drive awareness and water conservation behaviours. This will be achieved by utilising additional advertising mediums such as billboards, shopping centres, murals on Hunter Water assets and signage upgrades. More targeted messaging for younger demographics will be launched. Other marketing activities include television and radio advertising and program sponsorships which are complemented by our media and social media activities. Hunter Water's website is also being upgraded over the next year which will see more interactive and educative content available to customers on water conservation and other activities with water.

Awareness programs

Our key education programs and community activities during 2018-19 are described in Chapter 5.

Our new education program, Learning Together to Change our World, challenges students to tackle the real world problem of water scarcity and come up with solutions to help our communities save water through inquiry based learning. The goal has been to engage in collaborative learning journeys where we support learnings in curiosity, creativity and innovation that reach across the community.

More than 5,000 children learnt about water from our Bubbles and Squirt Water Saving Show which incorporates tips on how to 'love' water and where their water comes from. These shows are performed at primary schools and preschools in Hunter Water's area of operations.

Moving forward

We intend to continue to focus on residential water efficiency projects, customer education and awareness programs to improve water efficiency behaviours and help customers manage their water bills. We are expanding this to include non-residential customers to improve their education about these initiatives and drive behaviour change.

We intend to target specific groups in the community, including Aboriginal and Torres Strait peoples and organisations, environmental groups, young people, the business sector and development community over the coming 12 months with the intention to build awareness of water conservation, our challenges and opportunities to work together.

Annual community sponsorship program

Our community sponsorship programs and partnerships are described in Chapter 5.

Willingness to pay study - preparation for 2020 price path submission

In 2018-19, Hunter Water completed a willingness to pay study for discretionary expenditures including those with environmental benefit. A survey of customers was carried out to determine preferences for different tariff/price structures. This included customer views on water usage prices and the role of pricing in driving water conservation behaviour.

The outcomes of the willingness to pay study were used to justify the inclusion of discretionary expenditure in our recent pricing submission.

Moving forward

Hunter Water is using an Economic Level of Water Conservation (ELWC) methodology to assess water conservation and recycled water projects. Our ELWC methodology is designed to promote economically efficient investment in water conservation. It is a process for ranking the economic viability of candidate water conservation projects. It evaluates whether the cost of a water conservation project is less than the full value of water that it saves. If so, it is considered economically efficient for us to implement the water conservation project.



Hunter Water Regulation 2015

Hunter Water commenced the process of reviewing the Hunter Water Regulation 2015. The process will include consultation with appropriate stakeholders including the Department of Planning with the goal of preparing a Regulatory Impact Statement and changes to the regulation.

Moving forward

Future actions to continue the consultation and review process will include engagement with internal and external stakeholders over the next 12-24 month period.

Objective 13: Avoid environmental impacts and ensure the efficient use of resources

Environmental impact assessments and construction management

Environmental impact assessments were undertaken for the delivery of all new infrastructure. This includes construction contractors having construction environmental management plans for all relevant contracts. This practice will continue moving forward.

Waste avoidance and reduction

During 2018-19, the Waste Management Strategy prepared in 2017 continued to be implemented. The strategy was developed to establish actions to reduce the quantity of waste generated by civil maintenance work in particular, comply with all applicable waste laws, and reduce financial costs of managing waste and improve business efficiency. The actions have been completed with ongoing spoil and waste management systems in place to continue ongoing improvements.

Asset management activities

Hunter Water maintains an Asset Management System (AMS) consistent with ISO 55001. Our AMS activities and performance is detailed in Section 4.1.

Objective 14: Create a sustainable supply chain

A sustainable supply chain

Hunter Water has developed a sustainable procurement plan and it is being implemented. The Board has endorsed targets for sustainable procurement. Additional initiatives include Hunter Water joining the NSW Indigenous Chamber of Commerce in order to determine how to increase indigenous employment, and joining Social Traders to identify traders with a database of organisations with a disability.

Moving forward

Hunter Water has an objective to increase the proportion of its outsourced supply chain expenditure that involves work with social and indigenous enterprises over the next twelve months including actions contained within our Reconciliation Action Plan.

A Modern Slavery Statement will be produced by December 2020.



Objective 15: Sustainable land management

Conservation of biodiversity value of operational land

The *Biodiversity Conservation Act 2016* came into effect in August 2017. The new legislation introduces a new biodiversity offset scheme, an expanded biodiversity certification program and established the Biodiversity Conservation Trust. Biobank sites were replaced with Biodiversity Stewardship sites and Biobanking credits were replaced with Biodiversity Offset Scheme credits. Hunter Water has one biodiversity stewardship site at the Hunter Regional Botanic Gardens at Heatherbrae which was registered in May 2018.

Management of land contamination

Hunter Water has a well-developed strategy for managing contaminated sites. The strategy has continued to be rolled out during 2018-19. Key programs progressed during the reporting year have included the monitoring of groundwater contamination at our wastewater treatment plants, ongoing groundwater monitoring of land at Swansea which was subject to a chemical spill in 2013 and groundwater monitoring at an old council landfill which was operated on Hunter Water land at Stockton during the 1960's and 1970's.

In addition to the groundwater monitoring programs outlined above Hunter Water has standard procedures for ensuring that contamination is appropriately managed as part of capital project construction activities and routine operational activities.

Moving forward

Groundwater contamination assessments and monitoring will continue during 2019-20.

Water quality in Tomago catchment

In June 2019, Hunter Water began drawing water from the Tomago sandbeds to provide additional security for our dams, which have fallen to their lowest autumn levels in 13 years. Operation of the Tomago sandbeds is in accordance with the 'PFAS Operating Strategy for the Tomago Borefield'. The Strategy has been approved by the NSW PFAS Expert Panel. This includes a program of sampling and testing.

Moving forward

Hunter Water will continue to adhere to the PFAS Operating Strategy with the oversight of NSW Health. This will include continued groundwater quality monitoring and response. Monitoring and response actions will be reviewed at regular meetings between Hunter Water and NSW Health.

Regular meetings with the Department of Defence will continue and Hunter Water will continue involvement as a key stakeholder providing input into Defence's implementation of its PFAS remediation strategy.



Bushfire management

Implementation of our Bushfire Management Plan continued during 2018-19. Actions undertaken include:

- Ongoing management and inspections in the Tomago Borefield.
- Additional asset protection at Anna Bay WTP and Lemon Tree Passage WTP.
- Inspection of assets on the critical asset register to ensure that ongoing thinning and vegetation management is adequate.

Moving forward

A review of relevant legislation and update of the Bushfire Management Plan will be undertaken. An additional action moving forward is the development of Geographic Information Systems (GIS) layers for asset protection.

Weed management

Weed management programs have been implemented at a number of treatment plant sites over the past twelve months. Aquatic noxious weed control was also carried out within the waters and wetlands of Balickera Canal in accordance with our Environmental Protection Licence. A Biosecurity Strategy has been developed during the reporting period which will lead to improvements in the way that Hunter Water manages weeds and feral animals across its land holdings.

Hunter Water has been actively involved in the regional weeds committee, which has been looking at the best way to ensure that the requirements of the *Biosecurity Act 2015* are fulfilled.

Moving forward

We plan to prepare a program for weed management covering the next four years. Roll out of the Biosecurity Strategy will commence in 2019-20 with a strong focus on the roll out of programs that target priority weeds across Hunter Water land.

Objective 16: Reduce water consumption, wastewater generation and stormwater impacts

Water Cycle Management Plan

In 2018-19, we undertook benchmarking for the Cooperative Research Centre (CRC) for Water Sensitive Cities Index. We developed a Recycled Water Strategy that has provided a framework for the development of the Integrated Water Cycle Management Strategy.

Moving forward

Stakeholder engagement will continue to be a core initiative to support the implementation of integrated water management outcomes. Engagement with councils will continue through the interagency working group. The development of the Integrated Water Cycle Management Strategy will be completed by late 2019.



Objective 17: Effective contingency planning and management of environmental emergencies

Pollution Incident Response Management Plans

In accordance with requirements of the *Protection of the Environment Operations Act*, Hunter Water has prepared 17 specific Pollution Incident Response Management Plans which cover each of our systems and assets included in each of our EPA Environment Protection Licences. The Pollution Incident Response Management Plans detail the procedures to be followed in the event of pollution incidents in each area of operation. The plans are updated every 12 months.

Environmental incident investigations

We formally investigated (including root-cause analysis) two environmental incidents in 2018-19 including native vegetation clearing at Balickera and the removal of a reservoir at Morpeth which had heritage significance without appropriate environmental approvals. Actions have been logged with responsible areas of the business. Progress will be tracked and reported until the actions are closed out.

Hazardous chemical management

In 2018-19, the interim hazardous chemical improvement project was completed. The work included improvements to hazardous chemical areas at plants including Lemon Tree Passage WTP, Grahamstown WTP, Cessnock WWTW, Raymond Terrace WWTW and Kurri Kurri WWTW. The outcome of the improvements at these water and wastewater treatment plants is a reduced risk to the environment and community from an unplanned release of hazardous chemicals.

Moving forward

Hunter Water will implement the Major Hazardous Chemical project to continue improvements.



Objective 18: Conserve cultural heritage

Conservation of cultural heritage

Our heritage assets represent a rich history of over 100 years of the organisation's operations to supply drinking water, treat wastewater and maintain effective drainage of stormwater.

Figure 4-1 'The Res' – a 19th century underground drinking water reservoir located on The Hill



Hunter Water has 44 assets listed on its section 170 Heritage and Conservation Register. There is also one asset, Newcastle No. 1 and No. 2 reservoirs, which are listed on the State Heritage Register due to its historical association with the Walka and Chichester water supply schemes, the first and second water supply schemes for the Hunter district. Newcastle Reservoir No. 1 demonstrates the importance of aesthetic treatment in nineteenth century NSW water supply infrastructure and as one of only two NSW water reservoirs known to feature tied brick arches.

During 2018-19, activities working towards the conservation of our heritage assets including reviewing the heritage asset management strategy and moveable heritage policy were continued.

Moving forward

During 2019-20 we will roll out heritage training for relevant staff.

Objective 19: To be climate resilient

Climate change adaption strategy

During 2018-19, our climate change adaptation strategy was reviewed. As a result of the review the strategy was updated and redeveloped. Climate change and climate variability presents significant challenges in managing infrastructure to deliver water services to the Lower Hunter community. The strategy was been developed to respond to those challenges.

The adaptation strategy identifies five implementation themes of work to deliver adaptation that are aligned with seven key objectives. A catalogue of individual adaptation actions have been provided based on learnings from the national and international water sector, and other infrastructure sectors also dealing with the challenges of climate change.



Moving forward

Endorsement and approval of the adaptation strategy will be followed by the development of an implementation plan over the next 12 months.

Objective 20: To reduce greenhouse gas emissions

Carbon reduction studies

We have an aspirational goal of becoming carbon neutral by 2030. During the reporting period Hunter Water continued to investigate the challenges and opportunities for greenhouse gas emission reductions in the management of our water and wastewater infrastructure. A business case for a 9MW renewable energy generation project and a preliminary business case for a centralised biosolids treatment approach with energy recovery have been endorsed. Combined, these projects will reduce our grid-sourced electricity consumption by about 20 percent per annum and our carbon emissions by about 20 percent over the next price period.

Moving forward

In addition to the implementation of the above projects, we will continue to investigate opportunities for carbon reduction across a number of programs including energy management, renewable energy, intelligent networks, wastewater treatment, facilities and fleet, supply chain, and staff and community engagement.

Energy monitoring and reporting framework

We measure and verify our energy savings (both financial and GWh) quarterly, to track performance of energy efficiency projects each month. Final quarter results for 2018-19 are not yet published due to latency in data accessibility. However, Q3 results forecast annual savings via energy efficiency initiatives to be \$1.058 million and 5.01 GWh year-to-date, compared to our full year target of \$1m and 4.5 GWh.

Moving forward

We will continue existing measurement and verification. Our measurement and verification process will be revised to a new online platform which includes automation of the process calculations by December 2019.

Objective 21: Improve environmental performance through the acquisition of applied knowledge

Research and development

The R&D Strategy was finalised in November 2018. The strategy includes principles and a tool for prioritising R&D and maximising value. It seeks to align R&D projects with priorities, leveraging of funding and knowledge, and maximising the values of research to the organisation. The implementation of the strategy will facilitate this and is on track. With the implementation of the strategy, quarterly meetings of the R&D committee are no longer necessary.

Moving forward

The R&D program priorities will be reviewed in 2019-20.



4.2.3 Significant changes to the EMS in 2018-19

There were no significant changes to the EMS in 2018-19.

4.2.4 Major non-conformances with the EMS in 2018-19

No major non-conformances with the EMS were identified during third party certification audits or internal audits during 2018-19.



4.3 Quality Management System (QMS)

This section describes Hunter Water's quality management performance. It reports on compliance with clause 4.3 of our Operating Licence and details the quality management programs and activities completed during 2018-19 and the results and outcomes of these activities. Furthermore, it reports on the proposed programs and activities for 2019-20. The chapter also reports on any non-conformances with, and significant changes made to, our quality management system.

4.3.1 Overview of Hunter Water's QMS

We have implemented and maintain a quality management system (QMS). The system consists of systematic processes to manage the core functions of the organisation and is implemented to ensure the organisation consistently meets all of its product and service requirements, addresses its risks and opportunities and provides high levels of customer satisfaction while meeting regulatory requirements.

We achieved initial certification to ISO 9001:2008 *Quality Management Systems - Requirements* in August 2015 and later transitioned to ISO 9001:2015 *Quality Management Systems - Requirements* in June 2017. We have continuously maintained our certification and passed our most recent, external, annual surveillance audit (May 2019).

We have adopted an integrated approach to managing our management systems in the form of an Integrated Management System (IMS). The IMS provides processes, principles and guidelines across common functions of the different management systems. Individual management systems provide the subject matter expertise and inputs to the integrated processes. Elements of the ISO 9001 quality requirements are managed via the integrated processes, systems and data in Hunter Water's IMS and others are managed directly via the QMS.

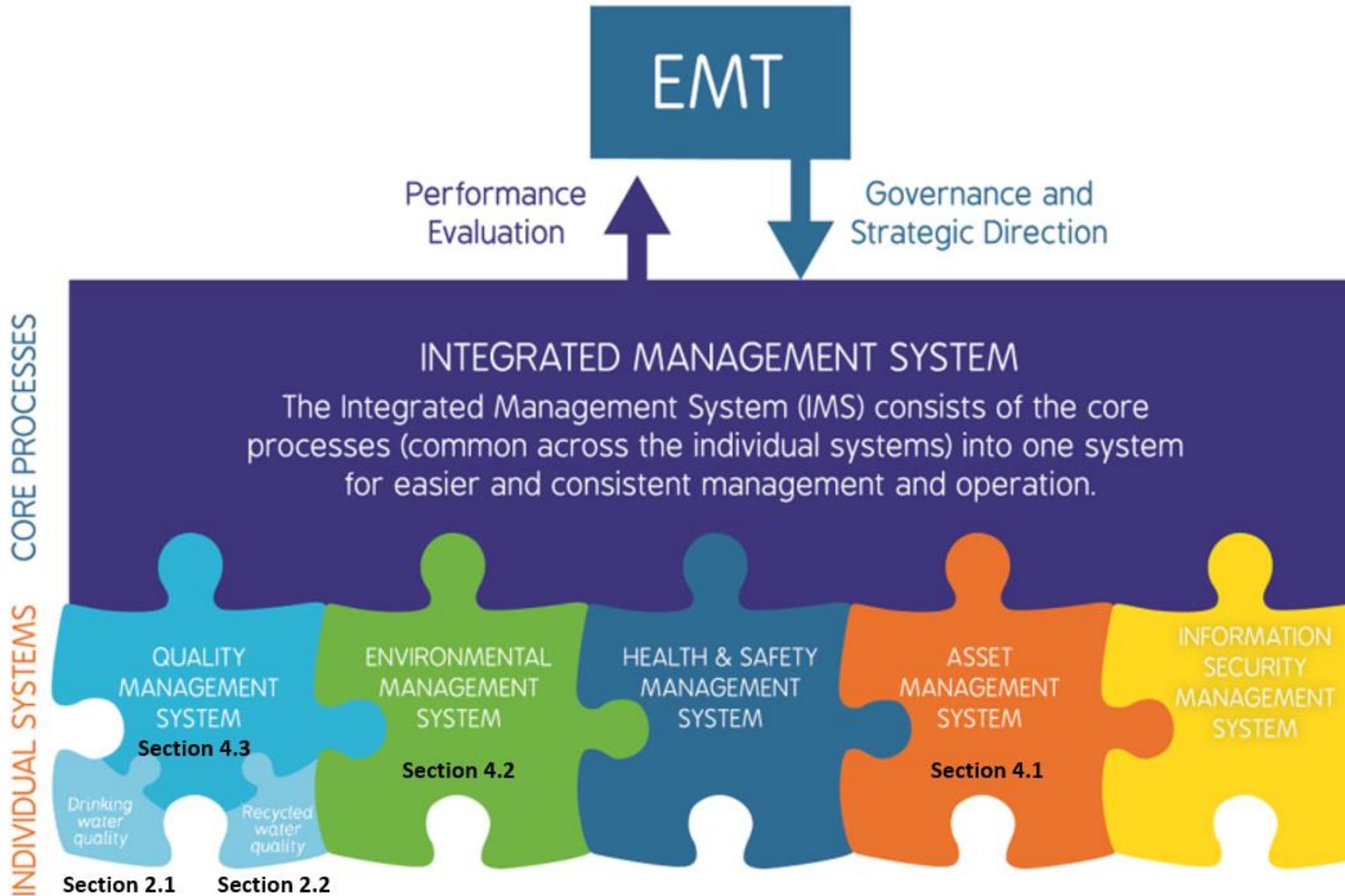
As a result of the integrated approach, only quality-specific requirements are managed directly by the quality management system. In addition, the requirements of the Australian Drinking Water Guidelines (ADWG) and Australian Guidelines for Water Recycling (AGWR) form two of the many requirements that we must comply with in providing our products and services. So, whilst they can be described in isolation, in practice they form part of the overall QMS for Hunter Water. The ADWG and AGWR are described in detail in Chapter 2 of this report.

The objectives of our IMS and QMS are:

- reliable, high quality water and wastewater service delivery
- customer satisfaction
- compliance
- continuous improvement
- meet stakeholder needs



Figure 4-2: Overview of our Integrated Management System and the applicable sections of the compliance and performance report





4.3.2 QMS - activities and programs completed during 2018-19

Activities and programs completed in 2018-19 to meet the objectives of the QMS/IMS are described in Table 4-3.

Table 4-3 IMS/QMS - activities and programs completed in 2018-19

Objectives	Activity / Program	Results / Outcomes
IMS		
Continuous Improvement	Update Hunter Water's learning & development standard and related procedures.	The learning and development standard was reviewed in May 2019.
	Implement a new integrated incident and risk management application (IIRMA) to capture and manage governance, risk, compliance and incident information.	All of the precursor work for this system has been undertaken with the IIRMA project incorporated into the proposed Go Digital work program for 2020-25. The business case has been completed and is currently going through the normal review and approval process applied to major investment decisions.
	Review and improve Hunter Water audit processes.	Work has been progressively completed to document the internal management system audit process, determine the audit program and adopt a triennial audit program.
	Implement new work practice library (document control) technology solution.	Our current incident and risk management software includes document control. It is prudent to defer investment into an upgraded solution until the procurement process for IIRMA is concluded.
Compliance	Map key processes and data input requirements for targeted information that will be managed in the new integrated incident and risk management application.	Business and solution requirements have been documented as necessary to ensure that a quality product is acquired.
QMS		
Continuous improvement	Formalising and improving operational performance through improved quality monitoring processes	The drinking water quality management system has been updated to strengthen key operational settings for disinfection. Our new proposed standards for critical control points have been referred to NSW Health for consideration.
	Quality engagement program	A focus has been continuing with the appropriate induction of employees and contractors. We have been working in the key foundational aspects of our business concerning the safe completion of daily operational tasks, awareness of fatal risk work standards, requirements for information management, procurement standards, business and assurance support services, training on core environmental requirements for work tasks and improved processes for asset management.
	Developer services programs	This year we released our developer works manual dedicated to supporting the developer works community, consultants, contractors, plumbers and the community. Our revised developer work practices will ensure that timely, cost effective and relevant processes are applied for the certification of new assets, network connections and overall service delivery.
	Customer service strategy	This year we completed a major customer service consultation process to ensure that we understand our customer preferences for service delivery. We engaged with our customers to ensure that we understood their needs and expectations relating to proposed water efficiency measures and targets. Our customer segmentation model has been



		refreshed for both residential and non- residential customers based on ANZIC codes. We have strengthened our capacity to understand our customer data by adopting new analytical software. Understanding and listening to our customer's experiences and values is a core pillar of our business and an essential aspect of our integrated management systems.
	Quality non-conformance program	Our quality non-conformance process is under review to ensure that all identified issues are properly analysed and the root-cause of a non-conformance properly identified.
Meet stakeholder needs	Customer engagement programs.	Our water conservation campaign "Love Water" has primarily focused on residential consumers. It has sparked curiosity and value in how we use water in our community. It has encouraged water wise behaviour. Over the past year 227,715 people have accessed the water usage calculator webpage to find out how much water they are using. Customer surveys show that over half of our respondents are becoming water wise and we estimate a 3.5% reduction water use. Our water and conservation education program and show reached nearly 6,500 students in the region. We had an active presence at conservation and sustainability focused community events across the region, with a combined attendance of more than 100,000 people.
Compliance	Reporting and Monitoring Protocol	We have created a reporting and monitoring protocol to document our reporting against Operating Licence system performance standards.



4.3.3 Proposed IMS and QMS activities and programs

Hunter Water works on a process of continual improvement to progressively develop and enhance the IMS / QMS. Future proposed activities and programs to meet the objectives of the QMS/IMS are described in Table 4-4.

Table 4-4 IMS/QMS - Proposed quality management activities and programs

QMS / IMS Objectives	Activity / Program	Activity Objective
Continuous improvement	Customer engagement – Service and experience program. New website. Continuation of the “your voice” program, schools program, community forums, the love water campaign and other similar activities.	We will continue to listen to our customers to properly understand their needs and expectations.
	Progressive delivery of the Go Digital ICT project	To deliver the integrated incident and risk management application to improve business management process, monitor and improve performance. Undertake a concurrent replacement of the document management system (Work Practice Library).
	New billing system	To reduce the risk of the existing system not performing as required as it approaches the end of its predicted life span. Standardise business process and reduce existing maintenance costs associated with the current system. Improve data management and promote faster billing processes.
Meeting stakeholder needs	Claims Management Standard and Aged Complaints strategy	To improve customer service and deliver on expectations
Compliance	Engagement of internal Management System Audit Provider	To ensure appropriate monitoring, review and improvement of management systems.

4.3.4 Significant changes to the QMS in 2018-19

Our resourcing plan and how we support the system is currently under review. This will not affect our commitment to continuous improvement. Our identified improvements and work activities relevant to the QMS will be pursued during 2019-20 (as described in Table 4-4). These improvement activities and programs are considered to be refinements to the QMS and IMS rather than significant changes.

4.3.5 Major non-conformances in the QMS and actions taken to resolve them

There have been no major non-conformances in the QMS during 2018-19. Our external management system provider, Bureau Veritas, has completed a surveillance audit across all of our management systems. Identified minor non-conformance issues, observations and opportunities for improvement are being addressed to ensure our systems progressively mature.



5 CUSTOMER AND STAKEHOLDER RELATIONS

This chapter describes the activities and achievements of our Customer and Community Advisory Group during 2018-19 and demonstrates our compliance with the Group's charter.

This chapter also identifies underlying complaint drivers and describes the actions taken to resolve root causes for complaints.

Any changes to the following are also outlined:

- customer contract
- procedures for payment difficulties and actions of non-payment
- charter for customer and community advisory group
- internal complaints handling procedures
- external dispute resolution scheme

5.1 Customer and Community Advisory Group (CCAG)

Our Operating Licence requires that we maintain and regularly consult with our customers through a customer advisory group. Our Customer and Community Advisory Group (CCAG) fulfils this purpose.

5.1.1 Compliance with the Customer and Community Advisory Group Charter

Our compliance with the CCAG Charter is demonstrated in Table 5-1.

Table 5-1 Compliance with the requirements of our Customer and Community Advisory Group's charter in 2018-19

Mandatory content	Charter reference	Charter requirement	Compliance
Role	Section 2 – Role of the Customer and Community Advisory Group	Section 2.1, 2.2 and 2.3 - To provide advice on the interests of customers and consumers of Hunter Water, the Customer Contract and other key issues related to Hunter Water's planning an operations.	Compliance with the requirements of this section is demonstrated by the range of topics discussed at CCAG during 2018-19. Minutes for all meetings (including actions taken by Hunter Water) are available at: https://yourvoice.hunterwater.com.au/ccag
How members and the Chair of the customer advisory group will be appointed	Section 3 – How Members and the Chair of the Customer and Community Advisory Group will be appointed	<p>A person representing each of the groups nominated in section 3.1 are included on the forum where practicable.</p> <p>The requirements of members are outlined in Section 3.2.</p> <p>The selection process is outlined in Section 3.3 and 3.4. Section 3.5 addresses membership vacancies.</p>	<p>In the last 12 months Hunter Water has increased representation on the CCAG through the recruitment of a number of new members.</p> <p>This followed active recruitment on Hunter Water's website, and through targeted advertising to key interest groups.</p> <p>Despite recruitment attempts, there are currently no members representing Indigenous Australians.</p> <p>Hunter Water has recently adopted a Reconciliation Action Plan. A key aim for 2019-20 will be to ensure the meaningful engagement of First Australians within our operations.</p> <p>Hunter Water will re-advertise for the vacant CCAG position in 2019-20.</p>



Mandatory content	Charter reference	Charter requirement	Compliance
Membership term	Section 4 – the term for which members are appointed	Section 4 provides for four year terms, with allowance for one renewal.	<p>Following a review process with the CCAG, Hunter Water adopted a new CCAG Charter in 2018-19. In adopting the new Charter, Hunter Water renewed all existing member terms. The new Charter establishes term limits, to ensure a healthy level of turnover of members.</p> <p>Additionally, in the year, a number of new members joined the CCAG including:</p> <ul style="list-style-type: none"> • Mr Joe Popov, representing the Community Disability Alliance Hunter (CDAH) • Cr Robert Aitchison, representing Maitland City Council • Ms Sue Johns, representing the National Seniors Association Newcastle Branch • Ms Ange Bevan, representing Hunter Commercial Services (a local Australian Disability Enterprise) • Ms Thea Bray, representing the Public Interest Advocacy Centre
Operations	Section 5 – Operations	<p>Section 5.1 - meetings will be held at least four times per year.</p> <p>Section 5.2 – Chairperson – Hunter Water will appoint an Independent Chair</p> <p>Section 5.3 – Attendance at meetings</p> <p>Section 5.4 – Quorum</p> <p>Section 5.5 – Meeting papers</p>	<p>Four meetings were held in 2018-19, with meetings in August 2018, November 2018, March 2019 and June 2019.</p> <p>Following the adoption of the updated CCAG Charter which included the requirement to have an independent chairperson, Hunter Water appointed Cr Paul Le Mottee (the representative of Port Stephens Council) as the CCAG’s independent chair for the period 26 September 2018 – 11 September 2020 (the conclusion of his current term as a Port Stephens Councillor).</p> <p>The invite list to CCAG meetings is restricted to CCAG members, Hunter Water staff and invited guests.</p> <p>All meetings held in 2018-19 satisfied the quorum requirement</p> <p>CCAG members are provided with meeting notice in advance of meetings, which includes the opportunity to help shape meeting agenda. Meeting papers were then</p>



Mandatory content	Charter reference	Charter requirement	Compliance
			distributed in advance of each meetings.
		Section 5.6 - Authority	The CCAG acted as an advisory committee for the full year.
		Section 5.7 – Conflict of Interests	A standing item on each CCAG agenda is an opportunity to declare conflicts of interest. Any declarations made are recorded in the minutes.
		Section 5.8 – Sub-committees/working parties	Nil working parties/sub committees were formed or held in 2018-19.
Procedures for monitoring issues raised at meetings	Section 6 – Monitoring and reporting on issues raised at the Customer and Community Advisory Group	Section 6.1 – Minutes – requires Hunter Water to maintain minutes of each meeting.	Minutes of each meeting are recorded, and tabled for adoption at the next meeting of the CCAG. Adopted minutes are published on the CCAG website and presented to Hunter Water’s Board of Directors. Minutes for all CCAG meetings held during 2018-19 are available on the CCAG website.
Types of matters raised and mechanisms.	Section 7 – Matters to be considered by the Customer and Community Advisory Group	Hunter Water will liaise with members to assemble the agenda and distribute in advance of meetings. Matters include: Performance objectives, consultation strategies, programs and activities, current and emerging issues.	Members are invited to submit items for the agenda, both in the form of substantive topics for inclusion and Questions on Notice. CCAG Members are also able to raise any topics (without notice) during General Business. Questions are documented in the Minutes, and actions recorded. Key matters raised in 2018-19 are described in Section 5.1.2, below.
Communicating meeting outcomes	Section 8 – Communicating the outcomes of the Customer and Community Advisory Group to the Public	Section 8.1 outlines Hunter Water’s reporting responsibilities including publication of adopted meeting minutes will be published on Hunter Water’s website. A summary of the Forum’s work will be included in Hunter Water’s Annual Report. Forum activities are to be included in newsletters to Hunter Water employees.	Meeting minutes are available on Hunter Water’s website. (see https://yourvoice.hunterwater.com.au/ccag) A summary of meetings will also be included in Hunter Water’s 2018-19 Annual Report. Updates on the Group were included in the employee newsletters.
Procedures for amending the charter	Section 10 – Charter Section 11 - Approvals	Section 10.1 – The CCAG’s charter will be updated at least once every four years. The Charter is to be approved by Hunter Water’s Board of Directors.	Hunter Water commenced a review of the CCAG in February 2018, with the University of Technology Sydney being engaged to undertake a strategic review session with members. In May 2018 the CCAG adopted a series of recommendations from the strategic review to improve CCAG operations, including a commitment to refresh the Group’s Charter. In August 2018 Hunter Water presented a draft updated Charter



Mandatory content	Charter reference	Charter requirement	Compliance
			to the CCAG. This was endorsed by members. The endorsed Charter was subsequently approved by Hunter Water's Board of Directors in September 2018. The new Charter is a living document, and is required to be reviewed by no later than September 2022.
Funding and resourcing	Section 9 – Funding and Resourcing of	Hunter Water will provide a venue and secretarial support for the CCAG. Members of the CCAG are paid a sitting fee consistent with the Premier's Memorandum (M2012-18 Classification and Remuneration Framework for NSW Government Boards and Committees). Hunter Water will reimburse members reasonable out of pocket expenses.	Hunter Water ensured appropriate venue and secretarial support was provided for each meeting. All CCAG members were provided with an option to collect the sitting fee for each meeting they attended in 2018-19. These fees were paid into the bank accounts nominated by members, or where nominated, paid to their organisation or a charity of their choice. Nil costs were reimbursed during 2018-19, however this option remains available to members if required.

Source: Hunter Water's 2017-2022 Operating Licence. Hunter Water analysis

5.1.2 Customer and Community Advisory Group activities and achievements 2018-19

In 2018-19, the CCAG considered a range of issues, including those recommended by Hunter Water, and self-generated topics that are of interest to members of the group.

In accordance with the Charter, matters were raised either for information or to receive feedback from members. It should be noted that the matters outlined in the following sections were relevant to the time they were raised, however further progress and/or changes may have resulted since that time.



5.1.3 Key matters and achievements in 2018-19

Strategic role of the Customer and Community Advisory Group

In May 2018, the CCAG adopted a series of actions associated with a review of the CCAG undertaken by the University of Technology Sydney's Institute for Sustainable Futures (ISF). The aim of the review was to adapt the CCAG into the 'advisory group' envisaged in Hunter Water's Operating Licence (the Group previously functioned as the Community Consultative Forum).

In 2018-19, Hunter Water has progressed agreed actions with the CCAG, including formalising agreed outcomes with the adoption of a new CCAG Charter in September 2018. The updated Charter improves the operation of the Group, modifying chairing protocols (with the appointment of an independent chairperson), restructuring the CCAG agenda to increase its strategic focus, improving communications through use of an online web portal (Your Voice) and increasing the frequency of meetings to quarterly.

Additionally, in considering the outcomes of the Hayne Royal Commission, Hunter Water's Board has proposed to increase the line of sight between community representatives and Board decision making, by adding a formal joint CCAG/Board session to the CCAG calendar each year. The first of these sessions is proposed to be held in October 2019, and will increase the frequency of CCAG meetings to 5 times per year.

Hunter Water's Strategic Direction (including corporate performance)

At each meeting as part of the Managing Director's report, Hunter Water provided an update on corporate performance, including against the 2017+3 Strategic Direction. Performance against the National Performance Report indicators was also considered and reported. Members encouraged Hunter Water to continue to focus on leakage reduction.

Drought

At each meeting Hunter Water provided an update on current water storage levels, and drought impacts, both within its area of operations and across the broader region. This included discussion about the drought tankering program with local councils, providing water donations to the broader Hunter community.

Water Resilience Program (including Lower Hunter Water Plan, and the Greater Hunter Regional Water Strategy)

Presentations were provided at each meeting on Hunter Water's Water Resilience Program, including updates on progress in the development of the review of the Lower Hunter Water Plan. Members considered and provided feedback on Hunter Water's approach to community engagement. Hunter Water invited an external representative from the Department of Industry to its March 2019 meeting to provide a briefing on the Greater Hunter Regional Water Strategy, which was then in draft.

Always On community engagement approach

Hunter Water presented on its approach to broad 'Always On' community engagement. Members queried management and encouraged increased focus on engagement activities with a broad cross section of Hunter Water's community. Hunter Water also presented on the outcomes of the Deliberative Forum engagements being undertaken for the Lower Hunter Water Plan.

Hunter Water's Price Submission

Hunter Water submitted its pricing proposal (price submission) to IPART on 30 June 2019. Throughout the proposal's development, Hunter Water provided updates to the CCAG. This included on the pricing process itself, the overall principles being utilised by Hunter Water in the proposal's development, and outlining the proposed community engagement approach (including the formal engagement exercises to be undertaken by IPART after the proposal is lodged).



5.2 Actions taken to resolve root causes of complaints

Overall in 2018-19, there was a 12% increase in complaints compared to 2017-18. Meter reading (billing) and damage claims from water main breaks (asset) are the primary drivers of this increase.

Meter reading complaints have been trending downward since February 2019. This improvement is attributed to changes made to internal systems, by the meter reading provider, and the implementation of a new meter reading system which has also improved read quality checks.

Complaints related to major breaks at Cardiff, Maitland and Wallsend have contributed to an increase in water service asset complaints during the year. Sewer odour complaints are on par with last year. Most odour complaints are related to the operation of the gravity sewer system which has been affected by ongoing dry weather up to May 2019.

During 2018-19, while the number of complaints logged increased by 12%, operational performance standards were maintained and outstanding aged complaints were reduced.

A program of activities, based on the outcomes of a complaint process journey map, was implemented to improve the effectiveness and timeliness of complaint responses for all Hunter Water case handlers. This resulted in, on average for 2018-19, 97% of complaints being resolved within 10 working days and a 38% reduction in outstanding aged complaints from 24 in January 2019 to 15 in June 2019.

In March 2019, the commitment tracker was also relaunched to ensure longer term commitments, to replace poor performing system assets, were being met by Hunter Water as another strategy to reduce the number of aged complaints. Since its launch, 62% of outstanding commitments have been resolved - from 63 to 31 by the end of June 2019.

In addition, the overall number of active complaints was maintained at 87 which was well below the target of 100 and a response was provided within 2 business days to 100% of cases referred by the Electricity and Water Ombudsman of NSW (EWON).



5.3 Changes to customer and stakeholder documentation and procedures

Hunter Water's Operating Licence Reporting Manual requires it to report any changes to the following documents and procedures.

5.3.1 Customer Contract

Our Operating Licence includes a Customer Contract that clarifies the relationship between Hunter Water and our customers and consumers. The Customer Contract provides clarity on the rights and obligations of each party, describes the services we provide to our customers, payment terms and assistance options for customers experiencing financial hardship, and information on enquiries, complaints and disputes.

There have been no changes to the Customer Contract during 2018-19.

5.3.2 Procedure for payment difficulties and actions for non-payment

We have focused in 2018-19 on developing awareness with community groups that provide support services to people that may know of the options available if circumstances are causing payment difficulty. We have expanded our presence at community events for groups providing support to refugees and people with a disability, after recognising the services of our assistance program may not be known to someone if they haven't previously experienced payment difficulty. Our "Bring Your Bills" days (run in conjunction with EWON and other government service providers) held at various geographical locations in our network continue to promote our assistance program to vulnerable customers in all locations.

At the same time, SMS contact was introduced into our list of actions for non-payment, in order to increase awareness and engagement from customers in correcting overdue amounts on their account. The step was introduced immediately prior to the flow of water to the property being restricted, in an attempt to notify the customer of this intended next step, and to prompt contact with us to discuss or pay the account. The introduction of the action has had a positive result, with our average number of completed restrictions reducing by 20% compared with 201-18. The use of SMS will increase in 2019-20 as we look to add it as a reminder to customers before the amount owed becomes overdue.

5.3.3 Customer Advisory Group Charter

In May 2018, Hunter Water engaged the University of Technology Sydney's Institute for Sustainable Futures to assist in a strategic review of the Customer and Community Advisory Group (CCAG). The review was initiated following the change of scope in the CCAG in line with the 'advisory group' status of the CCAG codified in the Operating Licence (the CCAG's predecessor was the Community Consultative Forum).

The updated Charter was developed in close collaboration with the membership, and has been re-ordered to better match with the Operating Licence requirements. The updated Charter was endorsed by the Committee, prior to formal adoption by Hunter Water's Board of Directors.

A copy is available on the Group's website: www.yourvoice.hunterwater.com.au/ccag

5.3.4 Internal complaints handling procedure

A Customer Complaint Management Standard and Guideline compliant to AS/NZS 10002:2014 is in place. This standard incorporates internal roles & responsibilities and is monitored and reviewed on a monthly basis. No changes were made in 2018-19.

5.3.5 External dispute resolution scheme (EWON)

Hunter Water is a member of EWON. Annual fees were paid for the 2018-19 period. No changes were made in 2018-19.



6 GLOSSARY

6.1 Acronyms

Process	Description
AWTP	Advanced Water Treatment Plant
ADWG	Australian Drinking Water Guidelines
AGWR	Australian Guidelines for Water Recycling
AMS	Asset Management System
CT	Contact time
CTGM	Chichester Trunk Gravity Main
CCP	Critical control point
DOS	Disinfection Optimisation Strategy
DWQMS	Drinking Water Quality Management System
EMP	Environmental Management Plan
EMS	Environmental Management System
EPA	NSW Environment Protection Authority
ERM	Enterprise Risk Management
EWON	Energy and Water Ombudsman of NSW
HU	Hazen unit
ILI	Infrastructure Leakage Index
IMS	Integrated Management System
IPART	Independent Pricing and Regulatory Tribunal
ISMS	Information Security Management Systems
ISO	International Organization for Standardization
LHWP	Lower Hunter Water Plan
ML/day	Megalitres per day – one megalitre is a measure of volume equal to one million litres
MPN	Most probable number
NCR	Non-compliance report
NPR	National Performance Report
NTU	Nephelometric Turbidity Units
NWI	National Water Initiative
OEH	NSW Office of Environment and Heritage
PFAS	Per- and poly-fluoroalkyl substances
QMS	Quality Management System
RWQMP	Recycled Water Quality Management Plan
RWQMS	Recycled Water Quality Management System
SCADA	Supervisory control and data acquisition
WELS	Water Efficiency Labelling and Standards Scheme
WHS	Work Health and Safety
WSAA	Water Services Association of Australia – peak industry body for the Australian water industry
WTP	Water Treatment Plant
WWTW	Wastewater Treatment Works



6.2 Water treatment terminology

Process	Description
Aeration	Aeration is typically used as a first step in the treatment of groundwater. The main function of aeration is to remove carbon dioxide and hydrogen sulphide from the water, and to add oxygen, which assists in iron removal. Water extracted from the Anna Bay Sandbeds and treated at Anna Bay and Nelson Bay Water Treatment Plants is naturally very low in iron and hydrogen sulphide, so the purpose of aeration at these plants is essentially to remove carbon dioxide and add oxygen.
Coagulation / Flocculation	During coagulation, liquid aluminium sulphate (alum) and/or polymer is added to untreated water (raw water). When mixed with the water, this causes tiny particles that are naturally present in the source water, when extracted, to stick together or coagulate. The heavier / larger coagulated material called 'floc' is easier to remove by settling or filtration.
Disinfection	<p>Water is disinfected before it enters the distribution system to ensure that any disease-causing bacteria, viruses, and parasites are destroyed. Chlorine is used because it is a very effective disinfectant, and residual concentrations can be maintained to guard against possible biological contamination in the water distribution system.</p> <p>CT values are used to calculate disinfectant dosage for the chlorination of drinking water. The CT value is the product of the concentration of chlorine and the contact time with the water being disinfected. It is expressed in units of min.mg/L.</p>
Filtration	<p>Water flows through a filter designed to remove particles in the water. The filters are made of layers of sand and gravel, and in some cases, crushed anthracite. Filtration collects the suspended impurities in water and enhances the effectiveness of disinfection. The filters are routinely cleaned by backwashing.</p> <p>Microfiltration is a filtration process which removes particles from water by passage through a microporous membrane.</p>
Fluoridation	Water fluoridation is the treatment of community water supplies for the purpose of adjusting the concentration of the free fluoride ion to the optimum level sufficient to reduce dental decay. Hunter Water is required to fluoridate in accordance with the <i>NSW Fluoridation of Public Water Supplies Act 1957</i> .
Membrane microfiltration	Membrane microfiltration is a type of physical filtration process where water is passed through a special pore-sized membrane to separate microorganisms and suspended particles from the raw water.
Powdered activated carbon (PAC) dosing (event based)	Powdered Activated Carbon (PAC) dosing is used to remove organic compounds from the water supply such as Geosmin and Methyl-Isoborneol (MIB) that periodically occur in surface waters. Geosmin and Methyl-Isoborneol (MIB) are naturally occurring compounds that have a musty, earthy taste and odour.
pH Correction	Lime is added to the filtered water to adjust the pH and stabilise the naturally soft water in order to minimise corrosion in the distribution system, and within customers' plumbing.
Sedimentation	As the water and the floc particles progress through the treatment process, they move into sedimentation basins where the water moves slowly, causing the heavy floc particles to settle to the bottom. Floc which collects on the bottom of the basin is called sludge, and is piped to drying lagoons.
Two-stage filtration (Lemon Tree Passage Water Treatment Plant)	<p>Flocculation occurs within roughing filters (also referred to as adsorption clarifiers) before separation is achieved. In the roughing filter the coagulated water is fed upwards through a bed of granular plastic media where the flocs are trapped within the filter media and the filter overflow exits for further treatment.</p> <p>Final polishing of water from the roughing filters occurs within the dual media (ie coal/sand) rapid gravity filters.</p>



6.3 Wastewater treatment terminology

Process	Description
Bioreactor	A bioreactor is a device that supports an aerobic or anaerobic biological environment.
Chloramine dosing	The application of chlorine and ammonia to water to form chloramines for the purpose of disinfection.
Chlorination	The application of chlorine to wastewater, generally for the purpose of disinfection, but frequently for accomplishing other biological or chemical results - aiding coagulation or controlling odours or sludge bulking in wastewater.
Clarification	Any process or combination of processes the main purpose of which is to reduce the concentration of suspended matter in a liquid.
Dissolved air floatation	Dissolved air floatation is a water treatment process where wastewater is clarified by the removal of suspended matter such as oil or solids. Air is dissolved under pressure in wastewater and then released at atmospheric pressure in a tank. The released air forms tiny bubbles which stick to the suspended matter causing it to float to the surface, where it is removed by a skimming device.
Grit removal	Grit removal is accomplished by providing an enlarged channel or chamber that causes the flow velocity to be reduced and allows the heavier grit to settle to the bottom of the channel where it can be removed.
Maturation pond	A shallow pond that ensures sunlight penetrates the full depth for photosynthesis to occur. Oxygen is provided by algae during photosynthesis and wind-aided surface aeration. These ponds are often mixed by recirculation to maintain dissolved oxygen throughout their entire depth.
Membrane filtration	Membranes are thin and porous sheets of material able to separate contaminants from water when a driving force is applied. They are used to remove bacteria and other microorganisms, particulate material, micropollutants, and natural organic material.
Microfiltration	A pressure-driven membrane filtration process that separates particles down to approximately 0.1 µm diameter from influent water using a sieving process.
Oxidation ponds	A man-made body of water in which waste is consumed by bacteria.
Reverse osmosis	The Reversed Osmosis (RO) process uses a semi-permeable membrane to separate and remove dissolved solids, organics, pyrogens, submicron colloidal matter, viruses, and bacteria from water. The process is called 'reverse' osmosis since it requires pressure to force pure water across a membrane, leaving the impurities behind.
Screening	Screening removes gross pollutants from the wastewater stream to protect downstream operations and equipment from damage. The screen has openings that are generally uniform in size. It retains or removes objects larger than the openings. A screen may consist of bars, rods, wires, gratings, wire mesh, or perforated plates.
Secondary treatment	Typically, a biological treatment process that is designed to remove approximately 85% of the biological oxygen demand and influent suspended solids. Some nutrients may incidentally be removed, and ammonia may be converted to nitrate.
Sedimentation	The process of settling and depositing of suspended matter carried by water or wastewater. Sedimentation usually occurs by gravity when the velocity of the liquid is reduced below the point at which it can transport the suspended material.
Sludge digesters	Tank in which complex organic substances like sewage sludges are biologically dredged. During these reactions, energy is released and much of the sewage is converted to methane, carbon dioxide, and water. These changes take place as microorganisms feed on sludge in anaerobic or aerobic digesters.
Tertiary filtration (dual media)	Filtration is used to separate nonsettleable solids from water and wastewater by passing it through a porous medium. Dual media filters use two media, commonly crushed anthracite



	coal and sand. Tertiary treatment is the final cleaning process that improves wastewater quality before it is reused, recycled or discharged to the environment.
Total Nitrogen	Excessive amounts of Total Nitrogen may lead to low levels of dissolved oxygen, therefore load limits are set to protect downstream water quality from algal blooms.
Trickling filters	Trickling filters are processes that use a static medium such as rocks for growing a film or biomass and then trickling the wastewater over this medium.
UV disinfection	Ultraviolet irradiation achieves disinfection by inducing photobiochemical changes within microorganisms. When ultraviolet radiation is absorbed by the cells of microorganisms, it damages the genetic material in such a way that the organisms are no longer able to grow or reproduce, thus ultimately killing them.

6.4 Key physical, chemical and microbiological drinking water quality parameters

Water Quality Parameter	Description
Aluminium	Aluminium occurs naturally in untreated water in the form of silts and clays. Aluminium sulphate (alum) is also used as a flocculent to remove unwanted colour and turbidity from water supplies. Research has shown that aluminium in drinking water does not make up a substantial proportion of aluminium ingested, and that aluminium in drinking water is no more bio-available than any other source.
Chlorine	Chlorine is used as a disinfectant in water treatment. It controls potentially harmful microorganisms to ensure the safety of drinking water.
Colour	Colour is measured in Hazen Units (HU). Colour can originate from organic matter in the soil through, or over, which the water has passed.
Copper	Copper is naturally present in both treated water and throughout the distribution system. However, soft water in contact with copper plumbing systems can on occasion give higher concentrations of copper at the customer tap. The incidence of high copper concentrations within Hunter Water's area of operation is very low, and customer complaints are infrequent.
E. coli	<i>Escherichia coli</i> is an indicator bacteria, that is, bacteria which are not normally harmful in themselves, but may indicate the presence of other pathogenic (disease-causing) microorganisms. <i>E. coli</i> is a type of thermo-tolerant coliform bacteria, and is nearly always present in the faeces of humans and other warm-blooded animals. <i>E. coli</i> is generally regarded as the most specific indicator of faecal contamination, and therefore an important indicator for public health.
Fluoride	In accordance with the <i>Fluoridation of Public Water Supplies Act 1957</i> , fluoride is added to the water to help prevent tooth decay and generally improve dental health.
Iron and Manganese	Iron and manganese may occur naturally at low levels in the water and may be responsible for taste and staining problems with the water.
Lead	Lead levels in Hunter Water's distribution system are typically less than the 0.001 mg/L limit of detection and well below the health guideline of 0.01 mg/L. Lead levels in customer plumbing can occasionally be elevated where water has lengthy residence time in contact with brass plumbing fittings. These contain small quantities of lead, and leaching into the water can occasionally occur. However this is very unlikely to cause continually elevated lead levels. Note that within the area serviced by Hunter Water, there is little or no lead pipework left in the plumbing systems.
pH	pH is a measure of the hydrogen ion concentration of water. A pH of 7 is neutral, greater than 7 is alkaline, and less than 7 is acidic. pH is important because it can affect the disinfection process.



Trihalomethanes	THMs are formed during the disinfection process by reaction between chlorine and mainly naturally-occurring organic substances. Treatment processes are controlled to minimise their production.
Turbidity	Turbidity refers to the cloudiness or dirtiness of water, and is measured by a light scattering technique. Turbidity is measured in Nephelometric Turbidity Units (NTU).
Zinc	As with other heavy metals, treated and reticulated water supplied by Hunter Water contains only very low levels of naturally occurring zinc. Some elevated levels in customer plumbing can be caused by old galvanised pipes and some leaching (“dezincification”) from older style brass fittings. Newer plumbing systems do not use galvanised steel, and brass fittings are normally “dezincification resistant”, so levels of zinc at the tap are rarely elevated.